

SEARCH REQUEST FORM

Scientific and Technical Information Center

Requester's Full Name: Mr. Xu Examiner #: 77924 Date: 2/18/04
 Art Unit: 1775 Phone Number 30 Serial Number: 10167406
 Mail Box and Bldg/Room Location: 5060 Results Format Preferred (circle): PAPER DISK E-MAIL

If more than one search is submitted, please prioritize searches in order of need.

Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: _____

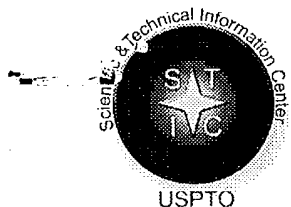
Inventors (please provide full names): _____

Earliest Priority Filing Date: _____

**For Sequence Searches Only* Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.*

STAFF USE ONLY

	Type of Search	Vendors and cost where applicable
Searcher: <u>Mike Newell</u>	NA Sequence (#) _____	STN <u>319.07</u>
Searcher Phone #: <u>571-272-2538</u>	AA Sequence (#) _____	Dialog _____
Searcher Location: <u>Remsen 4A30</u>	Structure (#) <u>1</u>	Questel/Orbit _____
Date Searcher Picked Up: <u>2/19/04</u>	Bibliographic _____	Dr.Link _____
Date Completed: <u>2/19/04</u>	Litigation _____	Lexis/Nexis _____
Searcher Prep & Review Time: <u>70</u>	Fulltext _____	Sequence Systems _____
Clerical Prep Time: _____	Patent Family _____	WWW/Internet _____
Online Time: <u>70</u>	Other _____	Other (specify) _____



STIC Search Report

EIC 1700

STIC Database Tracking Number: 114514

TO: Ling Xu
Location: REM 5D60
Art Unit : 1775
February 19, 2004

Case Serial Number: 10/671406

From: Michael Newell
Location: EIC 1700
REMSSEN 4A30
Phone: 571/272-2538
MNewell@uspto.gov

Search Notes

Note that answers 2, 4 and 6 include the applicants.

Note also the ring structure of the compound in answer 23 on page 67. I believe this is the only compound in the answer set (excluding the applicants) with three nitrogens in the 2-ring heterocycle.



STIC Search Results Feedback Form

EIC17000

Questions about the scope or the results of the search? Contact *the EIC searcher or contact:*

Kathleen Fuller, EIC 1700 Team Leader
571/272-2505 REMSEN 4B28

Voluntary Results Feedback Form

➤ I am an examiner in Workgroup: Example: 1713

➤ Relevant prior art **found**, search results used as follows:

- ☐ 102 rejection
- ☐ 103 rejection
- ☐ Cited as being of interest.
- ☐ Helped examiner better understand the invention.
- ☐ Helped examiner better understand the state of the art in their technology.

Types of relevant prior art found:

- ☐ Foreign Patent(s)
- ☐ Non-Patent Literature
(journal articles, conference proceedings, new product announcements etc.)

➤ Relevant prior art **not found**:

- ☐ Results verified the lack of relevant prior art (helped determine patentability).
- ☐ Results were not useful in determining patentability or understanding the invention.

Comments:

Drop off or send completed forms to EIC1700 REMSEN 4B28



SEARCH REQUEST FORM

Scientific and Technical Information Center

Examiner# : 77924

Art Unit : 1775

Phone Number: 272-1546

Date: 2/18/2004

Serial Number: 10/671,406

MailBox & Bldg/Room Location: Remsem 5D60

Results Format Preferred (circle): Paper Disk E-mail

If more than one search is submitted, please prioritize searches in order of need.

Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc., if known. Please attach a copy of the coversheet, pertinent claims, and abstract.

Title of Invention:

Novel heterocyclic compounds, materials for light emitting devices using the same

Inventors (please provide full names):

Hisashi Okada, Toshihiro Ise

Earliest Priority Filing Date: 7/22/1999

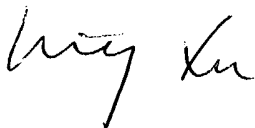
For Sequence Searches Only Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.

Please search the compound in claim 1, applicant elected compound 81 as ultimate species, see attached page. Please search the compound with the electroluminescent device, light emitting device or EL device.

If the elected species is not found, please extend to other species.

Please call me if you have any questions.

Thanks

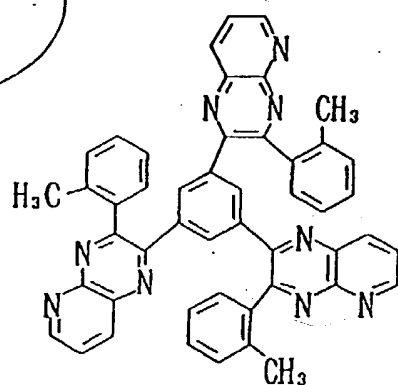


SCIENTIFIC REFERENCE BR
Sci. & Tech. Info. Cntr

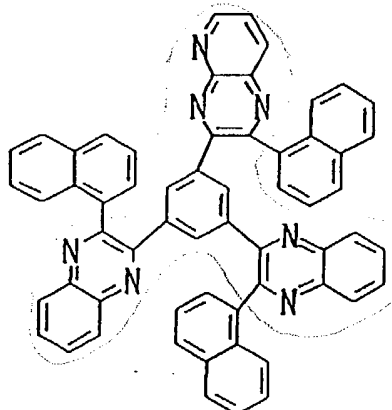
FEB 18

Pat. & T.M. Office

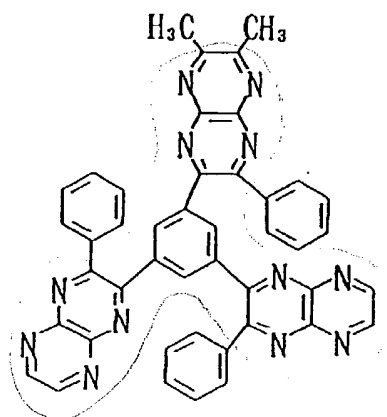
81.



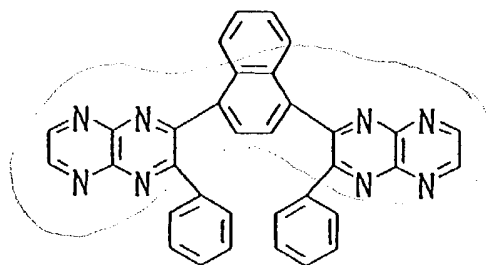
82.



83.

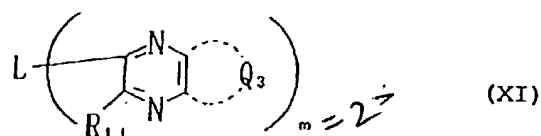


84.



What is claimed is:

1. A light emitting device comprising at least one organic layer including a light emitting layer between a pair of electrodes,
wherein the at least one organic layer comprises at least one compound represented by the following formula (XI):



wherein Q3 represents an atomic group necessary to form an aromatic heterocycle; R₁₁ represents a hydrogen atom or a substituent; m represents an integer of 2 or more; and L represents a connecting group.

2. The light emitting device of claim 1, wherein L represents a single bond or a group comprising alkylene, alkenylene, alkynylene, arylene, a divalent aromatic heterocycle or a combination of three arylenes with N.

3. The light emitting device of claim 2, wherein L represents a group comprising arylene, a divalent aromatic heterocycle or a combination of three arylenes with N.

4. The light emitting device of claim 1, wherein Q_3 represents an atomic group necessary to form a nitrogen-containing aromatic heterocycle.

5. The light emitting device of claim 4, wherein Q_3 represents an atomic group necessary to form a 5- or 6-membered nitrogen-containing aromatic heterocycle.

6. The light emitting device of claim 1, wherein Q_3 represents an atomic group required to form a furan, thiophene, pyran, pyrrole, imidazole, pyrazole, pyridine, pyrazine, pyrimidine, pyridazine, thiazole, oxazole, isothiazole, isoxazole, thiadiazole, oxadiazole, triazole, selenazole or tellurazole.

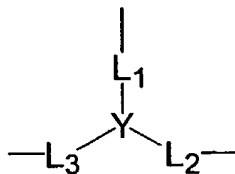
7. The light emitting device of claim 6, wherein Q_3 represents an atomic group required to form a pyridine, pyrazine, pyrimidine or pyridazine.

8. The light emitting device of claim 1, wherein m is 2 to 8.

9. The light emitting device of claim 8, wherein m is 2 to 4.

10. The light emitting device of claim 9, wherein m is 3.

11. The light emitting device of claim 1, wherein L represents

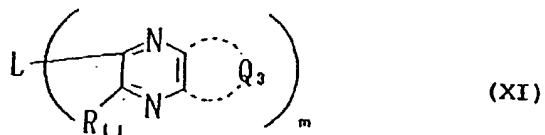


wherein L_1 , L_2 , and L_3 each represents a connecting group; and Y represents a nitrogen atom or a 1,3,5-benzenetriyl group and wherein m is 3.

12. The light emitting device of claim 11, wherein Y represents 1,3,5-benzenetriyl and wherein L_1 , L_2 , and L_3 each represents a single bond.

13. The light emitting device of claim 1, further comprising a polymer in the at least one organic layer.

14. A compound represented by the following formula (XI):



wherein Q_3 represents an atomic group necessary to form an aromatic heterocycle; R_{11} represents a hydrogen atom or a substituent; m represents an integer of 2 or more; and L represents a connecting group.

15. The compound of claim 14, wherein L represents a single bond or a group comprising alkylene, alkenylene, alkynylene, arylene, a divalent aromatic heterocycle or a combination of three arylenes with N.

16. The compound of claim 15, wherein L represents a group comprising arylene, a divalent aromatic heterocycle or a combination of three arylenes with N.

17. The compound of claim 14, wherein Q₃ represents an atomic group necessary to form a nitrogen-containing aromatic heterocycle.

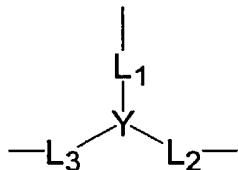
18. The compound of claim 17, wherein Q₃ represents an atomic group necessary to form a 5- or 6-membered nitrogen-containing aromatic heterocycle.

19. The compound of claim 14, wherein Q₃ represents an atomic group required to form a furan, thiophene, pyran, pyrrole, imidazole, pyrazole, pyridine, pyrazine, pyrimidine, pyridazine, thiazole, oxazole, isothiazole, isoxazole, thiadiazole, oxadiazole, triazole, selenazole or tellurazole.

20. The compound of claim 19, wherein Q₃ represents an atomic group required to form a pyridine, pyrazine, pyrimidine or pyridazine.

21. The compound of claim 14, wherein m is 2 to 8.

22. The compound of claim 21, wherein m is 2 to 4.
23. The compound of claim 22, wherein m is 3.
24. The compound of claim 14, wherein L represents



wherein L_1 , L_2 , and L_3 each represents a connecting group; and Y represents a nitrogen atom or a 1,3,5-benzenetriyl group and wherein m is 3.

25. The compound of claim 24, wherein Y represents 1,3,5-benzenetriyl and wherein L_1 , L_2 , and L_3 each represents a single bond.

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(FILE 'HOME' ENTERED AT 14:50:22 ON 19 FEB 2004)

FILE 'LREGISTRY' ENTERED AT 14:50:32 ON 19 FEB 2004

L1 STRUCTURE

FILE 'REGISTRY' ENTERED AT 14:56:44 ON 19 FEB 2004

L2 3 S L1 SSS SAM

L3 3 S L1 SSS SAM

L4 259 S L1 SSS FULL
SAVE L4 LIN406/A

FILE 'CAOLD' ENTERED AT 15:03:53 ON 19 FEB 2004

L5 2 S L4

FILE 'HCAPLUS' ENTERED AT 15:04:19 ON 19 FEB 2004

L6 137 S L4

L7 88311 S ELECTROLUM!N? OR ORGANOLUM!N? OR (ELECTRO OR ORGANO OR

L8 23 S L6 AND L7

L9 0 S L8 AND OKADA/AU
E OKADA H?/AU

L10 485 S E1 OR E106

L11 0 S L10 AND L6

FILE 'LREGISTRY' ENTERED AT 15:12:32 ON 19 FEB 2004

FILE 'HCAPLUS' ENTERED AT 15:14:37 ON 19 FEB 2004

=> d his full

(FILE 'HOME' ENTERED AT 14:50:22 ON 19 FEB 2004)

FILE 'LREGISTRY' ENTERED AT 14:50:32 ON 19 FEB 2004

L1 STRUCTURE

FILE 'REGISTRY' ENTERED AT 14:56:44 ON 19 FEB 2004

D QUE STAT L1

L2 3 SEA SSS SAM L1

D SCAN

D QUE STAT L1

L3 3 SEA SSS SAM L1

L4 259 SEA SSS FUL L1

SAVE L4 LIN406/A

FILE 'CAOLD' ENTERED AT 15:03:53 ON 19 FEB 2004

L5 2 SEA L4

D TI 1-2

FILE 'HCAPLUS' ENTERED AT 15:04:19 ON 19 FEB 2004
L6 137 SEA L4
L7 88311 SEA ELECTROLUM!N? OR ORGANOLUM!N? OR (ELECTRO OR ORGANO
OR ORG#) (2A)LUM!N? OR LIGHT?(2A) (EMISSION? OR EMIT?) OR
EL OR E(W)L OR OLED OR L(W)E(W)D OR LED/IT
L8 23 SEA L6 AND L7
L9 0 SEA L8 AND OKADA/AU
E OKADA H?/AU
L10 485 SEA "OKADA H"/AU OR "OKADA HISAHIRO"/AU
L11 0 SEA L10 AND L6

FILE 'LREGISTRY' ENTERED AT 15:12:32 ON 19 FEB 2004

FILE 'HCAPLUS' ENTERED AT 15:14:37 ON 19 FEB 2004

FILE HOME

FILE LREGISTRY
LREGISTRY IS A STATIC LEARNING FILE

FILE REGISTRY
Property values tagged with IC are from the ZIC/VINITI data file
provided by InfoChem.

STRUCTURE FILE UPDATES: 18 FEB 2004 HIGHEST RN 651705-73-6
DICTIONARY FILE UPDATES: 18 FEB 2004 HIGHEST RN 651705-73-6

TSCA INFORMATION NOW CURRENT THROUGH JULY 14, 2003

Please note that search-term pricing does apply when
conducting SmartSELECT searches.

Crossover limits have been increased. See HELP CROSSOVER for detail

Experimental and calculated property data are now available. For mor
information enter HELP PROP at an arrow prompt in the file or refer
to the file summary sheet on the web at:
<http://www.cas.org/ONLINE/DBSS/registryss.html>

FILE CAOLD
FILE COVERS 1907-1966
FILE LAST UPDATED: 01 May 1997 (19970501/UP)

This file contains CAS Registry Numbers for easy and accurate
substance identification. Title keywords, authors, patent
assignees, and patent information, e.g., patent numbers, are

now searchable from 1907-1966. TIFF images of CA abstracts printed between 1907-1966 are available in the PAGE display formats.

This file supports REGISTRY for direct browsing and searching of all substance data from the REGISTRY file. Enter HELP FIRST for more information.

FILE HCAPLUS

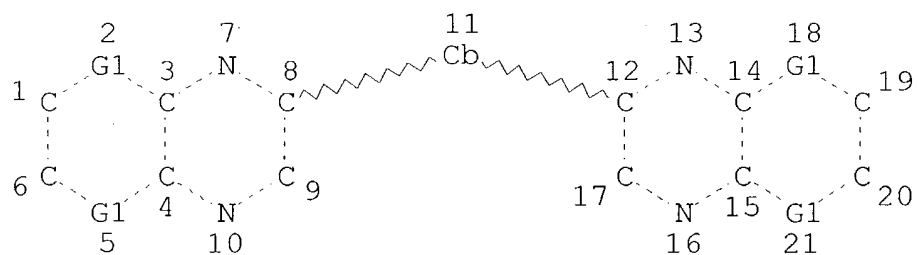
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FILE COVERS 1907 - 19 Feb 2004 VOL 140 ISS 8
FILE LAST UPDATED: 18 Feb 2004 (20040218/ED)

This file contains CAS Registry Numbers for easy and accurate substance identification.

=> d que stat l1

L1 STR



VAR G1=C/N

NODE ATTRIBUTES:

DEFAULT MLEVEL IS ATOM

GGCAT IS UNS AT 11

DEFAULT ECLEVEL IS LIMITED

GRAPH ATTRIBUTES:

RING(S) ARE ISOLATED OR EMBEDDED

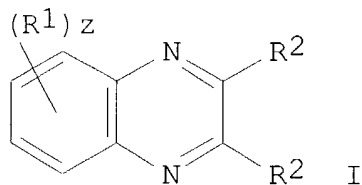
NUMBER OF NODES IS 21

STEREO ATTRIBUTES: NONE

=> d 18 1-23 cbib abs hitstr hitind

L8 ANSWER 1 OF 23 HCAPLUS COPYRIGHT 2004 ACS on STN
 2004:41818 Document No. 140:119650 Charge transport compositions and electronic devices made with such compositions. Lecloux, Daniel David; Guidry, Mark A.; Herron, Norman; Radu, Nora S.; Smith, Eric Maurice; Wang, Ying (E.I. Du Pont De Nemours and Company, USA). PCT Int. Appl. WO 2004006355 A2 20040115, 54 pp. DESIGNATED STATES: W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG, TR. (English). CODEN: PIXXD2. APPLICATION: WO 2003-US21618 20030709. PRIORITY: US 2002-PV394767 20020710; US 2003-PV458277 20030328.

GI



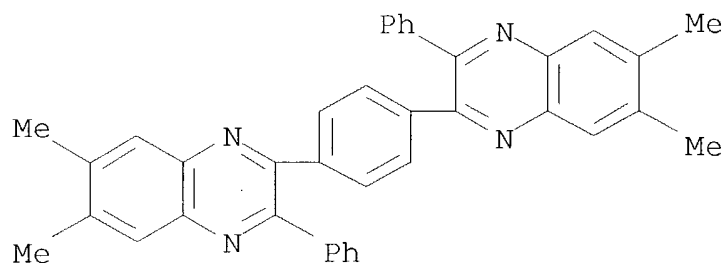
AB Compns. are described which comprise quinoxaline derivs. described by the general formula I (R1 and R2 are the same or different at each occurrence and are selected from H, F, Cl, Br, alkyl, heteroalkyl, alkenyl, alkynyl, aryl, heteroaryl, alkylenearyl, alkenylaryl, alkynylaryl, alkyleneheteroaryl, alkenylheteroaryl, alkynylheteroaryl, CnHaFb, OCnHaFb, C6HcFd, and OC6HcFd; both R2 together may constitute an arylene or heteroarylene group; a, b, c, and d = 0 or an integer such that a+b = 2n + 1, and c + d = 5; n = an integer; and z = 0-4). Electronic devices (e.g., **light-emitting diodes, light-emitting** electrochem. cells, or photodetectors) comprising ≥ 1 photoactive layer and a second layer are also described in which ≥ 1 layer comprises the quinoxaline derivs.

IT 647375-65-3P 647375-69-7P

(quinoxaline deriv.-contg. compns. and electronic devices made using them)

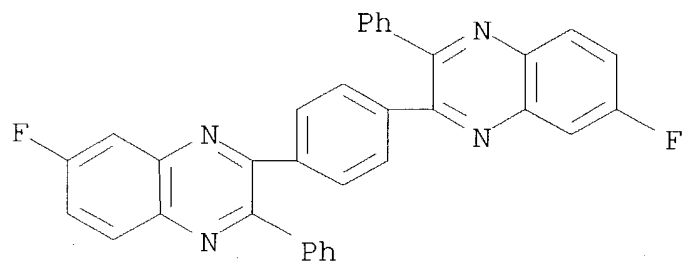
RN 647375-65-3 HCAPLUS

CN Quinoxaline, 2,2'-(1,4-phenylene)bis[6,7-dimethyl-3-phenyl- (9CI)
(CA INDEX NAME)



RN 647375-69-7 HCAPLUS

CN Quinoxaline, 2,2'-(1,4-phenylene)bis[7-fluoro-3-phenyl- (9CI) (CA
INDEX NAME)



IC ICM H01L051-50

ICS H01L051-30; C07D471-14; C07D241-46; C07D241-44; C07D241-42;
C07D401-14; C07F007-08; C07F015-00; C07D519-00; C07D409-14

CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

Section cross-reference(s): 28, 72, 76

ST quinoxaline deriv compn electronic device;

electroluminescent device quinoxaline deriv; photodetector

quinoxaline deriv; **light emitting** electrochem

cell quinoxaline deriv

IT Electrochemical cells

(**light-emitting**; quinoxaline deriv.-contg.

compns. and electronic devices made using them)

IT **Electroluminescent** devices

Optical detectors

(quinoxaline deriv.-contg. compns. and electronic devices made

using them)
 IT 4559-60-8P 17401-62-6P 19802-70-1P 32387-86-3P 36305-56-3P
 36305-63-2P 112657-94-0P 205367-28-8P 364067-15-2P
 370851-72-2P 410526-67-9P 647375-50-6P 647375-53-9P
 647375-59-5P 647375-61-9P 647375-62-0P 647375-63-1P
 647375-64-2P **647375-65-3P** 647375-66-4P 647375-67-5P
 647375-68-6P **647375-69-7P**

(quinoxaline deriv.-contg. compns. and electronic devices made using them)

L8 ANSWER 2 OF 23 HCAPLUS COPYRIGHT 2004 ACS on STN

2003:586746 Document No. 139:157123 **Electroluminescent**

device containing heterocyclic compound with condensed aromatic rings. Okada, Hisashi (Fuji Photo Film Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2003217856 A2 20030731, 38 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2002-10167 20020118.

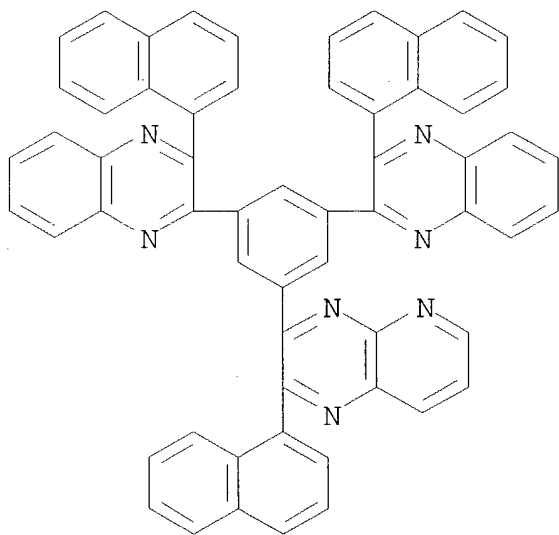
AB The invention refers to an **electroluminescent** device comprising at least one compd. L(A)m [A = two or more arom. rings condensed on a heterocyclic ring; m < 2; L = bridging group].

IT **377092-14-3**

(**electroluminescent** device contg. heterocyclic compd. with condensed arom. rings)

RN 377092-14-3 HCAPLUS

CN Pyrido[2,3-b]pyrazine, 3-[3,5-bis[3-(1-naphthalenyl)-2-quinoxaliny]phenyl]-2-(1-naphthalenyl)- (9CI) (CA INDEX NAME)

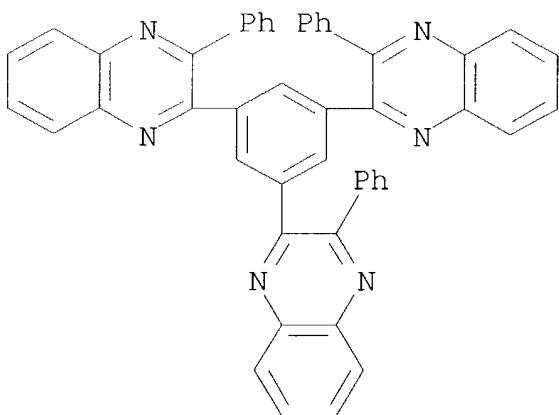


IC ICM H05B033-14

ICS C09K011-06; H05B033-22

CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related

- Properties)
- ST **electroluminescent** device heterocyclic condensed arom
electron transport
- IT **Electroluminescent** devices
Electron transport
(**electroluminescent** device contg. heterocyclic compd.
with condensed arom. rings)
- IT 358974-66-0 377092-10-9 **377092-14-3** 428455-07-6
569682-33-3 569682-34-4
(**electroluminescent** device contg. heterocyclic compd.
with condensed arom. rings)
- L8 ANSWER 3 OF 23 HCAPLUS COPYRIGHT 2004 ACS on STN
2003:219419 Document No. 138:245304 Structures and properties of
organic **electroluminescent** devices. Kitazawa, Daisuke;
Kohama, Toru; Tominaga, Takeshi (Toray Industries, Inc., Japan).
Jpn. Kokai Tokkyo Koho JP 2003086381 A2 20030320, 11 pp.
(Japanese). CODEN: JKXXAF. APPLICATION: JP 2001-271543 20010907.
- AB The devices comprise: a glass substrate; an ITO electrode; a hole
transport, a phosphor, an electron transport and a metal electrode,
where the electron transport layer comprises a heterocyclic compd.
(mol. wt. > 580) having > 2 nitrogen in ≥ 1 heterocyclic ring
and doped with ≥ 1 electron donor.
- IT **203915-06-4**
(structures and properties of org. **electroluminescent**
devices)
- RN 203915-06-4 HCAPLUS
- CN Quinoxaline, 2,2',2''-(1,3,5-benzenetriyl)tris[3-phenyl- (9CI) (CA
INDEX NAME)



- IC ICM H05B033-22
ICS C09K011-06; H05B033-14

CC 73-5 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

ST property org **electroluminescent** heterocyclic electron transport device

IT Crystal impurities
Electrodes
 Electroluminescent devices
 Electron donors
 Electron transport
 Films
 Glass substrates
 Hole transport
 Phosphors
 (structures and properties of org. **electroluminescent** devices)

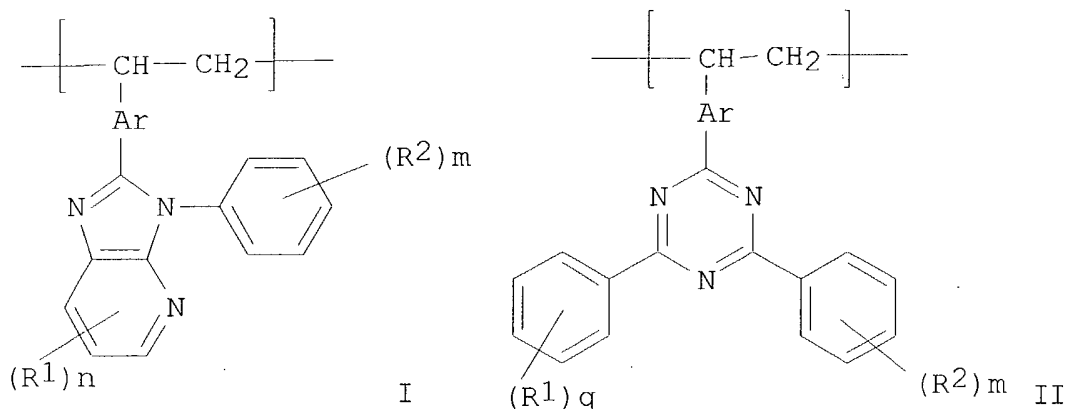
IT Heterocyclic compounds
 (structures and properties of org. **electroluminescent** devices)

IT 147-14-8, Copper phthalocyanine 2085-33-8, Tris(8-quinolinolato)aluminum 7429-90-5, Aluminum, uses 7440-46-2, Cesium, uses 50926-11-9, ITO 87433-10-1 123847-85-8, [1,1'-Biphenyl]-4,4'-diamine, N,N'-di-1-naphthalenyl-N,N'-diphenyl-171408-95-0 200052-70-6, DCJTB **203915-06-4** 215596-68-2 427375-49-3 501686-89-1 501686-90-4
 (structures and properties of org. **electroluminescent** devices)

L8 ANSWER 4 OF 23 HCAPLUS COPYRIGHT 2004 ACS on STN

2002:354001 Document No. 136:377202 **Light-emitting** device and material therefor. Okada, Hisashi; Ise, Toshihiro; Mishima, Masayuki; Taguchi, Toshiki (Fuji Photo Film Co., Ltd., Japan). U.S. Pat. Appl. Publ. US 2002055014 A1 20020509, 91 pp. (English). CODEN: USXXCO. APPLICATION: US 2001-935711 20010824. PRIORITY: JP 2000-254171 20000824; JP 2001-38718 20010215; JP 2001-236419 20010803.

GI



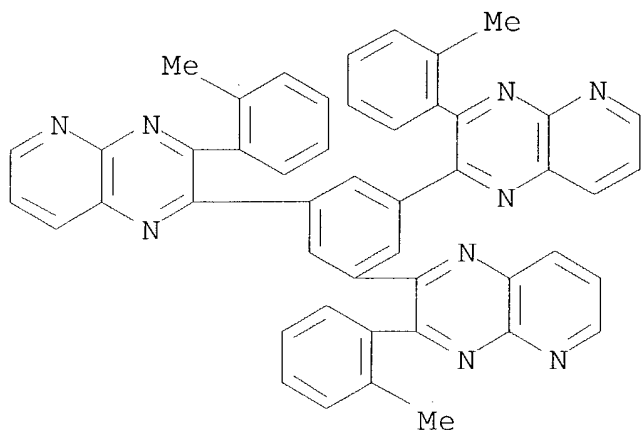
AB **Light-emitting** devices comprising a pair of electrodes formed on a substrate and org. compd. layers comprising a **light-emitting** layer provided in between the electrodes are described in which ≥ 1 of the org. compd. layers comprises a heterocyclic compd. having ≥ 2 atoms and a phosphorescent compd.; polymers with repeating units described by the general formulas I and II (Ar = arylene or divalent heterocyclic group; R¹ and R² = independently selected H or substituent; n = 0-3; q = 0-5; and m = 0-5), which may be employed as the heterocyclic compds. in the devices, are also described. The devices may also employ polymers of heterocyclic compds. from which AR is absent. The phosphorescent compd. may be an org. metal complex.

IT 377092-13-2

(**light-emitting** devices with emitting layers including heterocyclic compds. and phosphorescent materials and heterocycle deriv. polymers for them)

RN 377092-13-2 HCAPLUS

CN Pyrido[2,3-b]pyrazine, 2,2',2''-(1,3,5-benzenetriyl)tris[3-(2-methylphenyl)- (9CI) (CA INDEX NAME)



IC ICM H05B033-14
 ICS C08F026-06
 NCL 428690000
 CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
 Section cross-reference(s): 27, 28, 38, 76
 ST **electroluminescent** device heterocycle phosphorescent compd
 mixt active layer; polymer heterocycle phosphorescent compd mixt
 active layer **electroluminescent** device
 IT Phosphorescent substances
 (light-emitting devices with emitting layers
 including heterocyclic compds. and phosphorescent materials and
 heterocycle deriv. polymers for them)
 IT Polycarbonates, uses
 (light-emitting devices with emitting layers
 including heterocyclic compds. and phosphorescent materials and
 heterocycle deriv. polymers for them)
 IT **Electroluminescent** devices
 (org.; light-emitting devices with emitting
 layers including heterocyclic compds. and phosphorescent
 materials and heterocycle deriv. polymers for them)
 IT 147-14-8, Copper phthalocyanine 2085-33-8, Tris(8-
 hydroxyquinolinato)aluminum 4733-39-5, Bathocuproine 7429-90-5,
 Aluminum, uses 7789-24-4, Lithium fluoride, uses 12033-89-5,
 Silicon nitride, uses 15082-28-7 24964-91-8,
 Tris(4-bromophenyl)aminium hexachloroantimonate 25067-59-8,
 Poly(N-vinylcarbazole) 37271-44-6 38215-36-0, Coumarin-6
 50926-11-9, ITO 51269-91-1 58328-31-7 65181-78-4,
 N,N'-Bis(3-methylphenyl)-N,N'-diphenylbenzidine 94928-86-6
 153838-48-3 173394-18-8 182069-71-2 343978-78-9 350025-75-1
 350025-76-2 350025-78-4 350025-79-5 359014-69-0 370878-69-6
 377092-13-2 422574-54-7, Silicon nitride oxide

(SiN0.300.7) 422574-58-1 422574-60-5 422574-62-7 422574-66-1
 422574-67-2 422574-68-3 422574-70-7 422574-72-9 422574-73-0
 422574-74-1 422574-76-3 422574-77-4 422574-78-5 422574-84-3
 422574-85-4 422574-86-5 422574-87-6 422574-88-7 422574-89-8
 422574-90-1 423117-91-3 423117-92-4 423117-94-6 423117-96-8
 423117-97-9 423117-99-1 423118-00-7 423118-01-8 423118-03-0
 423118-05-2 423721-05-5 423721-07-7 423721-09-9

(**light-emitting** devices with emitting layers

including heterocyclic compds. and phosphorescent materials and heterocycle deriv. polymers for them)

IT 313950-73-1P 328238-10-4P 358974-66-0P 377092-02-9P
 377092-06-3P 377092-10-9P 422574-56-9P 422574-64-9P
 422574-83-2P

(**light-emitting** devices with emitting layers

including heterocyclic compds. and phosphorescent materials and heterocycle deriv. polymers for them)

IT 62-53-3, Aniline, reactions 95-53-4, o-Toluidine, reactions
 104-15-4, p-Toluenesulfonic acid, reactions 108-44-1, m-Toluidine,
 reactions 578-66-5, 8-Aminoquinoline 586-75-4, 4-Bromobenzoyl
 chloride 603-35-0, Triphenylphosphine, reactions 769-92-6
 876-08-4, 4-Chloromethylbenzoyl chloride 2039-82-9, 4-Bromostyrene
 2156-04-9, 4-Vinylphenylboronic acid 2351-37-3,
 4,4'-Biphenyldicarbonyl chloride 3842-55-5, 2-Chloro-4,6-diphenyl-
 1,3,5-triazine 4422-95-1, 1,3,5-Benzenetricarbonyl trichloride
 5470-18-8, 2-Chloro-3-nitropyridine

(**light-emitting** devices with emitting layers

including heterocyclic compds. and phosphorescent materials and heterocycle deriv. polymers for them)

IT 34949-41-2P 54696-64-9P 54696-67-2P 78750-58-0P 350025-73-9P
 350025-74-0P 377092-01-8P 377092-03-0P 377092-04-1P
 377092-05-2P 377092-07-4P 377092-08-5P 422574-55-8P
 422574-61-6P 422574-63-8P 422574-79-6P 422574-80-9P
 422574-81-0P 422574-82-1P

(**light-emitting** devices with emitting layers

including heterocyclic compds. and phosphorescent materials and heterocycle deriv. polymers for them)

IT 50851-57-5
 (polyethylene dioxythiophene doped with; **light-emitting** devices with emitting layers including heterocyclic compds. and phosphorescent materials and heterocycle deriv. polymers for them)

IT 126213-51-2, Poly(3,4-ethylenedioxythiophene)
 (polystyrene sulfonate-doped; **light-emitting** devices with emitting layers including heterocyclic compds. and phosphorescent materials and heterocycle deriv. polymers for them)

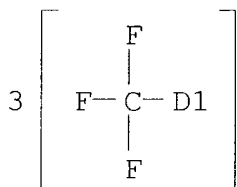
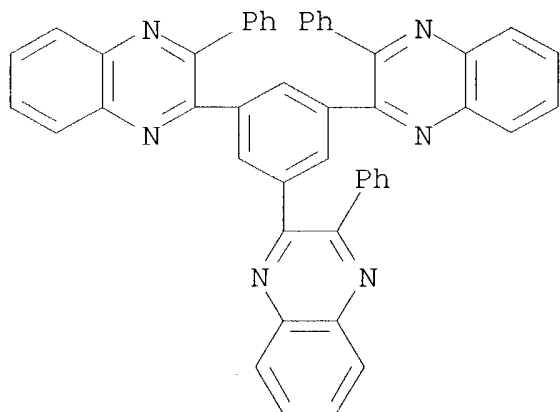
2002:299583 Document No. 137:147123 Electronic structure and localized states in starburst trisphenylquinoxaline. Schrader, Sigurd K.; Casu, Maria Benedetta; Imperia, Paolo; Jandke, Markus; Strohriegl, Peter (Institut fur Physik, Universitat Potsdam, Germany). Proceedings of SPIE-The International Society for Optical Engineering, 4464(Organic Light-Emitting Materials and Devices V), 163-171 (English) 2002. CODEN: PSISDG. ISSN: 0277-786X. Publisher: SPIE-The International Society for Optical Engineering.

AB Quinoxaline model compds. are interesting materials for Org. **Light Emitting** Devices (OLEDs) because of their thermal stability and their higher ionization potential in comparison to other electron transporting/hole blocking materials. The authors studied a starburst trisphenylquinoxaline by UPS and Thermally Stimulated Luminescence (TSL). UPS provided not only the characterization of the valence band structure but also parameters like ionization potential, 6 eV, and, combined with absorption spectroscopy, electron affinity, that are of crucial importance in designing optimized **OLED** configurations. However, a wide distribution of localized states occurs in org. layers due to several factors and TSL can study these states. The combination of the used techniques together with semi-empirical quantum chem. calcn., gave a detailed description not only of the valence and conduction band of the studied materials, i.e. The energy position of HOMO and LUMO, but also of the trap distributions localized in the band gap: a shallow one at 0.06 eV and a deeper state centered at 0.24 eV. The full spectroscopic and elec. characterization of the material formed the background for understanding its behavior in heterolayer devices.

IT **214132-60-2**
(electronic structure and localized states in starburst trisphenylquinoxaline and its applications)

RN 214132-60-2 HCAPLUS

CN Quinoxaline, 2,2',2''-(1,3,5-benzenetriyl)tris[3-phenyl-6(or 7)-(trifluoromethyl)- (9CI) (CA INDEX NAME)]



CC 73-5 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

Section cross-reference(s): 22, 76

IT **Electroluminescent** devices

Electronic structure

HOMO (molecular orbital)

Ionization potential

Simulation and Modeling, physicochemical

Thermoluminescence

UV photoelectron spectra

(electronic structure and localized states in starburst trisphenylquinoxaline and its applications)

IT **214132-60-2**

(electronic structure and localized states in starburst trisphenylquinoxaline and its applications)

L8 ANSWER 6 OF 23 HCAPLUS COPYRIGHT 2004 ACS on STN

2001:873334 Document No. 136:12632 New heterocyclic compound for **electroluminescent** device. Okada, Hisashi; Ise, Toshihiro (Fuji Photo Film Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2001335776 A2 20011204, 52 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2000-218967 20000719. PRIORITY: JP 1999-207957 19990722; JP 2000-80734 20000322.

AB The invention relates to new heterocyclic compds., suited for use in

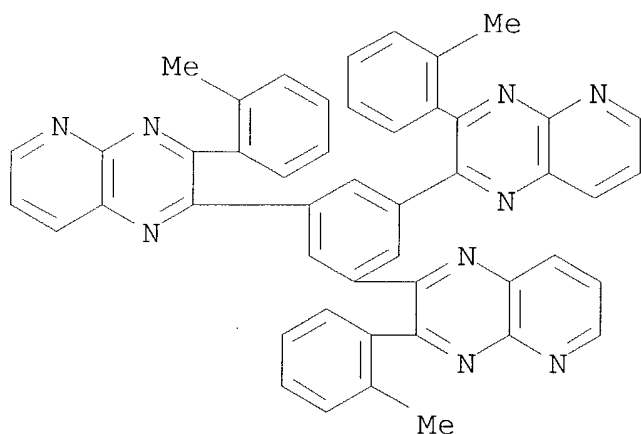
making an **electroluminescent** device, represented by L-(A)_m
 [A = heterocyclic group having ≥ 2 arom. hetero ring
 condensed; m = integer ≥ 2 ; L = bonding group].

IT 377092-13-2P 377092-14-3P

(in prepn. of new heterocyclic compd. for
electroluminescent device)

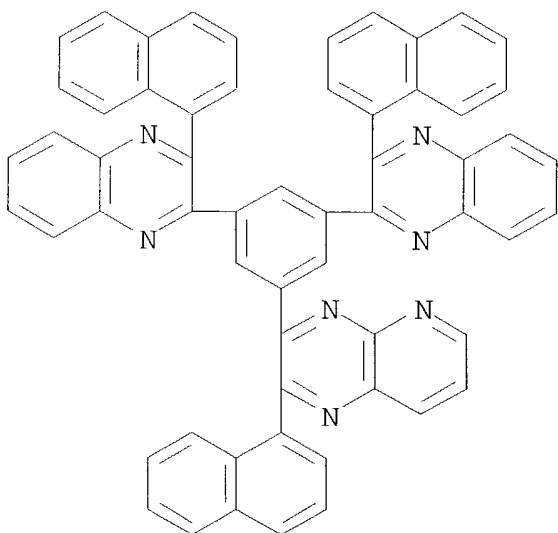
RN 377092-13-2 HCAPLUS

CN Pyrido[2,3-b]pyrazine, 2,2',2''-(1,3,5-benzenetriyl)tris[3-(2-methylphenyl)- (9CI) (CA INDEX NAME)



RN 377092-14-3 HCAPLUS

CN Pyrido[2,3-b]pyrazine, 3-[3,5-bis[3-(1-naphthalenyl)-2-quinoxaliny]phenyl]-2-(1-naphthalenyl)- (9CI) (CA INDEX NAME)



IC ICM C09K011-06
ICS C09K011-06; C07D519-00; C07F007-08; C07F007-30; H05B033-14;
H05B033-22; C08F012-26; C08F226-06

CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related
Properties)
Section cross-reference(s): 28

ST **electroluminescent** device heterocyclic compd

IT Luminescent substances
(**electroluminescent**; new heterocyclic compd. for
electroluminescent device)

IT Heterocyclic compounds
(for **electroluminescent** device)

IT Dehydration reaction
(in prepn. of new heterocyclic compd. for
electroluminescent device)

IT **Electroluminescent** devices
(new heterocyclic compd. for **electroluminescent** device)

IT 313950-73-1P 328238-10-4P 358974-66-0P 377092-02-9P
377092-06-3P 377092-10-9P 377092-11-0P 377092-12-1P
377092-13-2P 377092-14-3P 377092-15-4P
377092-16-5P 377092-17-6P
(in prepn. of new heterocyclic compd. for
electroluminescent device)

IT 62-53-3, Aniline, reactions 95-53-4, o-Toluidine, reactions
108-44-1, m-Toluidine, reactions 578-66-5, 8-Aminoquinoline
769-92-6, 4-tert-Butylaniline 2351-37-3, 4,4'-
Biphenyldicarbonylchloride 4422-95-1, Trimesic acid trichloride
5470-18-8, 2-Chloro-3-nitropyridine 57863-69-1 349666-24-6
(in prepn. of new heterocyclic compd. for
electroluminescent device)

IT 34949-41-2P 54696-64-9P 54696-67-2P 78750-58-0P 350025-83-1P
350025-84-2P 377092-01-8P 377092-04-1P 377092-05-2P
377092-07-4P 377092-08-5P 377092-09-6P
(in prepn. of new heterocyclic compd. for
electroluminescent device)

IT 471-34-1, Calcium carbonate, reactions 6192-52-5,
p-Toluenesulfonic acid monohydrate 7775-14-6, Sodium hydrosulfite
13454-89-2, Copper iodate
(in prepn. of new heterocyclic compd. for
electroluminescent device)

IT 377092-03-0P
(in prepn. of new heterocyclic compd. for
electroluminescent device)

L8 ANSWER 7 OF 23 HCAPLUS COPYRIGHT 2004 ACS on STN
2001:853875 Document No. 136:175113 Thermally stimulated processes in
heterocyclic materials suitable for heterolayer organic

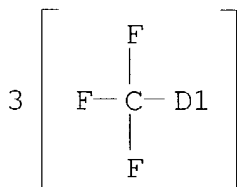
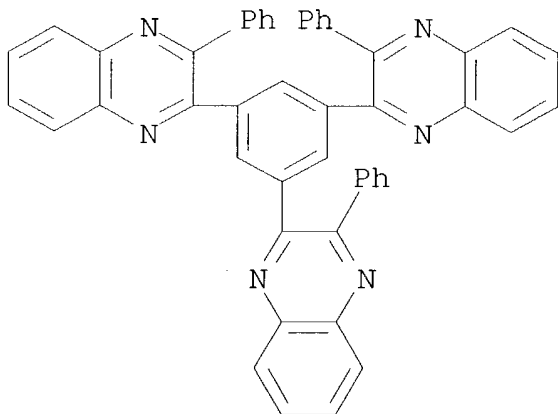
light emitting diodes. Imperia, P.; Casu, M. B.; Schrader, S.; Falk, B.; Jandke, M.; Strohmriegl, P. (Institut fur Physik, Universitat Potsdam, Potsdam, D-14469, Germany). *Synthetic Metals*, 124(1), 83-85 (English) 2001. CODEN: SYMEDZ. ISSN: 0379-6779. Publisher: Elsevier Science S.A..

AB The authors studied UPS and thermally stimulated processes in 2 types of phenylquinoxalines, and one type of starburst trisphenylquinoxaline to characterize the valence band structure and the localized states. An ionization potential of .apprx.6.0 eV was detd. for each material using UPS. Thermally stimulated discharge currents (TSDC) gave evidence of dipolar and/or charge transport mechanisms. The authors assigned each TSDC peak to the different elementary processes using in addn. dielec. spectroscopy (DES), and from thermally stimulated luminescence (TSL) curves, performed for the 1st time on these materials, the authors estd. the mean trap depths.

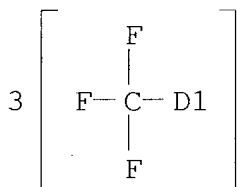
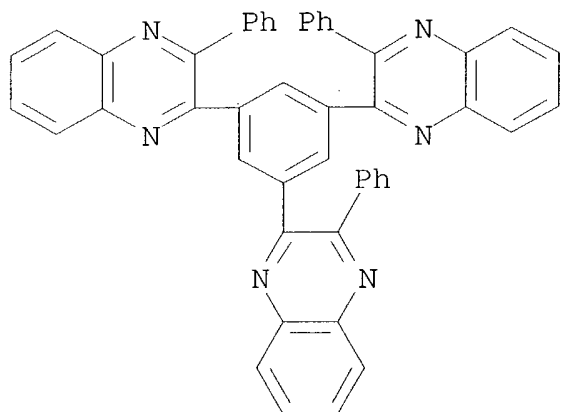
IT **214132-60-2**
(thermally stimulated processes in heterocyclic materials suitable for heterolayer org. **light emitting** diodes)

RN 214132-60-2 HCAPLUS

CN Quinoxaline, 2,2',2''-(1,3,5-benzenetriyl)tris[3-phenyl-6(or 7)-(trifluoromethyl)- (9CI) (CA INDEX NAME)



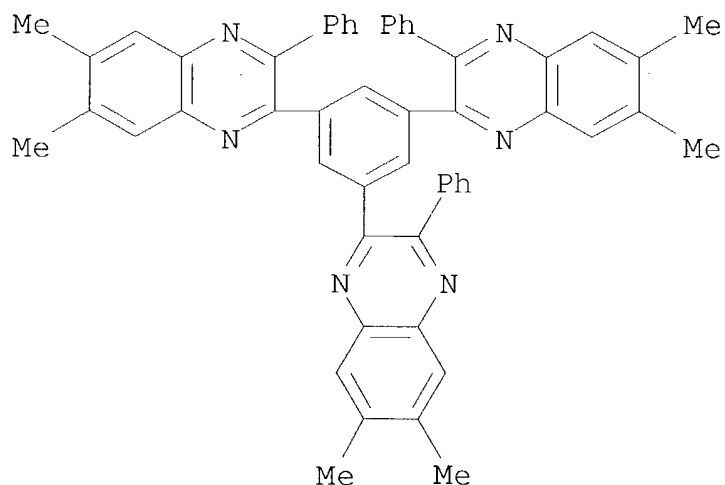
- CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
- IT **Electroluminescent** devices
(org.; thermally stimulated processes in heterocyclic materials suitable for heterolayer org. **light emitting** diodes)
- IT Dielectric spectroscopy
Thermally stimulated current
Thermoluminescence
UV photoelectron spectra
Valence band
(thermally stimulated processes in heterocyclic materials suitable for heterolayer org. **light emitting** diodes)
- IT 37196-95-5 73935-40-7 **214132-60-2**
(thermally stimulated processes in heterocyclic materials suitable for heterolayer org. **light emitting** diodes)
- L8 ANSWER 8 OF 23 HCAPLUS COPYRIGHT 2004 ACS on STN
2001:853874 Document No. 136:158094 Ultraviolet photoelectron spectroscopy on new heterocyclic materials for multilayer organic **light emitting** diodes. Casu, M. B.; Imperia, P.; Schrader, S.; Falk, B.; Jandke, M.; Strohmriegl, P. (Institut fur Physik, Universitat Potsdam, Potsdam, D-14469, Germany). Synthetic Metals, 124(1), 79-81 (English) 2001. CODEN: SYMEDZ. ISSN: 0379-6779. Publisher: Elsevier Science S.A..
- AB Electronic band structure of three heterocyclic model compds.: 5,12-dihydro-quinoxalino-2,3-b-phenazine; 7,18-dihydro-5,7,11,16,18,20,22-octaaza-nonacene; and 1,3,5-Tris[(3-phenyl-6-trifluoro-methyl)-quinoxaline-2-yl]benzene was studied by UPS. The authors also detd. their ionization potential, between 5.3 and 6.0 eV, suggesting that these materials can efficiently act as electron transporting layer in org. **light emitting** devices (OLEDs).
- IT **214132-60-2**
(UPS on new heterocyclic materials for multilayer org. **light emitting** diodes)
- RN 214132-60-2 HCAPLUS
- CN Quinoxaline, 2,2',2''-(1,3,5-benzenetriyl)tris[3-phenyl-6(or 7)-(trifluoromethyl)- (9CI) (CA INDEX NAME)



- CC 73-6 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
 Section cross-reference(s): 22, 28
- ST UPS heterocyclic multilayer org LED; **light emitting** diode heterocyclic compd ionization potential
- IT Band gap
Electroluminescent devices
 Electron affinity
 Ionization potential
 UV photoelectron spectra
 (UPS on new heterocyclic materials for multilayer org. **light emitting** diodes)
- IT Heterocyclic compounds
 (UPS on new heterocyclic materials for multilayer org. **light emitting** diodes)
- IT 531-47-5, 5,12-Dihydro-quinoxalino-2,3-b-phenazine
 214132-60-2 367947-32-8
 (UPS on new heterocyclic materials for multilayer org. **light emitting** diodes)
- L8 ANSWER 9 OF 23 HCAPLUS COPYRIGHT 2004 ACS on STN
 2001:730906 Document No. 135:280269 **Electroluminescent**
 devices employing organic luminescent material/clay nanocomposites.
 Park, O-Ok; Lee, Tae-Woo (Korea Advanced Institute of Science and

Technology, S. Korea). PCT Int. Appl. WO 2001072925 A1 20011004, 20 pp. DESIGNATED STATES: W: DE, JP, KR, US. (English). CODEN: PIXXD2. APPLICATION: WO 2001-KR534 20010330. PRIORITY: KR 2000-16466 20000330.

- AB **Org. luminescent** material/clay nanocomposites, prep'd. in a form of quantum well by blending an **org. luminescent** material and a nanoclay, are described and **electroluminescent** devices employing the nanocomposites as active layers are discussed. The **electroluminescent** (**EL**) devices comprise a transparent substrate; a semitransparent electrode deposited on the transparent substrate; a clay nanocomposite emissive layer spin-coated with the **org. EL** material/clay nanocomposite, positioned on the semitransparent electrode; and, a metal electrode deposited on the clay nanocomposite emissive layer. The **EL** devices can also contain a hole transporting layer positioned on the semitransparent electrode and/or an electron transporting layer positioned on the clay nanocomposite emissive layer.
- IT **203915-07-5**
(electron-transporting layer; **electroluminescent** devices employing **org. luminescent** material/clay nanocomposites contg.)
- RN 203915-07-5 HCAPLUS
- CN Quinoxaline, 2,2',2''-(1,3,5-benzenetriyl)tris[6,7-dimethyl-3-phenyl- (9CI) (CA INDEX NAME)



- IC ICM C09K011-00
ICS C09K011-06; H05B033-14
- CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

Section cross-reference(s): 38, 76

- ST **electroluminescent** device **org**
luminescent clay nanocomposite; **OLED** polymer clay
nanocomposite; **luminescent** material **org** polymer
clay nanocomposite
- IT Amines, uses
(aryl, tertiary, hole-transporting layer;
electroluminescent devices employing **org**.
luminescent material/clay nanocomposites contg.)
- IT Laminated materials
(clay; **electroluminescent** devices employing **org**
. **luminescent** material/clay nanocomposites contg.)
- IT Amines, uses
(diamines, arom.; **electroluminescent** devices employing
org. luminescent material/clay nanocomposites
contg.)
- IT Alloys, uses
(electrode; **electroluminescent** devices employing
org. luminescent material/clay nanocomposites
contg.)
- IT **Electroluminescent** devices
Luminescent substances
Nanocomposites
Quantum well devices
(**electroluminescent** devices employing **org**.
luminescent material/clay nanocomposites)
- IT Clays, uses
(**electroluminescent** devices employing **org**.
luminescent material/clay nanocomposites)
- IT Glass substrates
(**electroluminescent** devices employing **org**.
luminescent material/clay nanocomposites contg.)
- IT Coordination compounds
Polyacetylenes, uses
Polyanilines
Polymers, uses
Polyquinolines
(**electroluminescent** devices employing **org**.
luminescent material/clay nanocomposites contg.)
- IT Poly(arylenealkenylenes)
(poly(arylene vinylene); **electroluminescent** devices
employing **org. luminescent** material/clay
nanocomposites contg.)
- IT Polyquinoxalines
(polyphenylquinoxalines, poly(phenylquinoxaline);
electroluminescent devices employing **org**.
luminescent material/clay nanocomposites contg.)
- IT Polyesters, uses

- (substrate; **electroluminescent** devices employing **org. luminescent** material/clay nanocomposites contg.)
- IT 7439-89-6, Iron, uses 7439-92-1, Lead, uses 7439-93-2, Lithium, uses 7440-05-3, Palladium, uses 7440-06-4, Platinum, uses 7440-22-4, Silver, uses 7440-33-7, Tungsten, uses 7440-50-8, Copper, uses 7440-57-5, Gold, uses 7440-66-6, Zinc, uses 7440-74-6, Indium, uses (electrode; **electroluminescent** devices employing **org. luminescent** material/clay nanocomposites contg.)
- IT 7439-95-4, Magnesium, uses 7440-70-2, Calcium, uses (electrode; **electroluminescent** devices employing **org. luminescent** material/clay nanocomposites contg.)
- IT 7429-90-5, Aluminum, properties (electrode; **electroluminescent** devices employing **org. luminescent** material/clay nanocomposites contg.)
- IT 9003-53-6, Polystyrene (**electroluminescent** devices employing **org. luminescent** material/clay nanocomposites contg.)
- IT 25067-59-8, Poly(N-vinylcarbazole) 115708-89-9 (**electroluminescent** devices employing **org. luminescent** material/clay nanocomposites contg.)
- IT 138184-36-8 (**electroluminescent** devices employing **org. luminescent** material/clay nanocomposites contg.)
- IT 120-12-7, Anthracene, uses 198-55-0, Perylene 517-51-1, Rubrene 7385-67-3, Nile red 25067-58-7, Polyacetylene 25087-26-7 25190-62-9, Poly(p-phenylene) 25233-34-5, Polythiophene 30604-81-0, Polypyrrole 38215-36-0, coumarin 6 51325-91-8, 4-(Dicyanomethylene)-2-methyl-6-(p-dimethylaminostyryl)-4H-pyran 65181-78-4, (N,N'-Diphenyl-N,N'-bis(3-methylphenyl)-1,1'-biphenyl-4,4'-diamine) 95270-88-5, Polyfluorene 150405-69-9 (**electroluminescent** devices employing **org. luminescent** material/clay nanocomposites contg.)
- IT 192198-85-9 203915-07-5 302921-88-6 (electron-transporting layer; **electroluminescent** devices employing **org. luminescent** material/clay nanocomposites contg.)
- IT 2085-33-8, Alq3 (electron-transporting layer; **electroluminescent** devices employing **org. luminescent** material/clay nanocomposites contg.)
- IT 288-13-1, Pyrazole 58328-31-7 123847-85-8, 4,4'-Bis[N-(-naphthyl-1-)-N-phenylamino]biphenyl (hole-transporting layer; **electroluminescent** devices

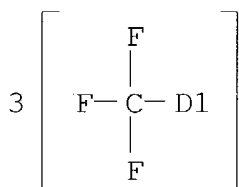
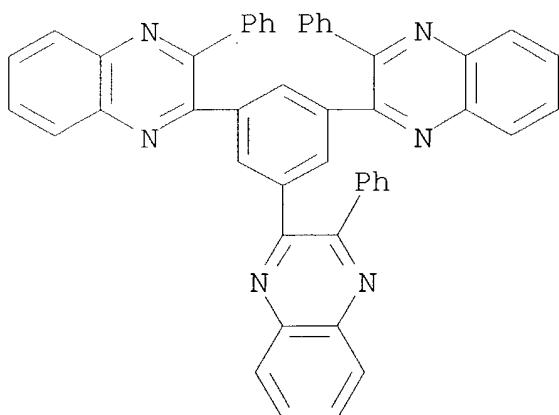
- employing **org. luminescent** material/clay nanocomposites contg.)
- IT 1318-93-0, Montmorillonite, properties (nanoclay; **electroluminescent** devices employing **org. luminescent** material/clay nanocomposites contg.)
- IT 1318-74-7, Kaolinite, uses 53320-86-8, Laponite (nanoclay; **electroluminescent** devices employing **org. luminescent** material/clay nanocomposites contg.)
- IT 1335-25-7, Lead oxide 126213-51-2, Polyethylene dioxythiophene (semitransparent electrode; **electroluminescent** devices employing **org. luminescent** material/clay nanocomposites contg.)
- IT 50926-11-9, Indium tin oxide (semitransparent electrode; **electroluminescent** devices employing **org. luminescent** material/clay nanocomposites contg.)
- IT 14808-60-7, Quartz, uses 25038-59-9, Polyethylene terephthalate, uses (substrate; **electroluminescent** devices employing **org. luminescent** material/clay nanocomposites contg.)

L8 ANSWER 10 OF 23 HCAPLUS COPYRIGHT 2004 ACS on STN
 2001:583180 Document No. 135:336419 Long-range energy transfer of singlet and triplet excitations in dye-doped tris(phenylquinoxaline). Blumstengel, S.; Meinardi, F.; Tubino, R.; Gurioli, M.; Jandke, M.; Stroehriegel, P. (INFN and Dipartimento di Scienza dei Materiali, Universita di Milano-Bicocca, Milan, 20125, Italy). Journal of Chemical Physics, 115(7), 3249-3255 (English) 2001. CODEN: JCPSA6. ISSN: 0021-9606. Publisher: American Institute of Physics.

AB To obtain efficient **org. LEDs** (OLEDs) it is necessary to funnel both singlet and triplet excitons generated by electroexcitation to the emitting dye mol. Energy transfer plays a decisive role. Mechanisms and kinetics of the energy transfer process were studied, involving singlet and triplet excitations in a donor-acceptor system suitable for use as active layer in OLEDs. Fluorescent and phosphorescent 1,3,5-tris[(3-phenyl-6-trifluoromethyl)quinoxalin-2-yl]benzene served as donor and a red emitting Pt 2,3,7,8,12,13,17,18-octaethyl-21H,23H-porphyrin as acceptor mol. Efficient energy transfer from the singlet and triplet excited state of the donor to the acceptor mols. takes place by combined long-range dipole-dipole interaction and diffusion. Due to the different oscillator strengths of radiative transitions from the singlet and triplet excited state to the singlet ground state the rate of energy transfer of triplet excitons is several orders of

magnitude slower than that of singlet excitons. Since the lifetime of both states differ by the same order of magnitude the transfer efficiency is comparable.

IT **214132-60-2**
 (long-range energy transfer of singlet and triplet excitations in platinum octaethylporphyrin-doped)
 RN 214132-60-2 HCAPLUS
 CN Quinoxaline, 2,2',2''-(1,3,5-benzenetriyl)tris[3-phenyl-6(or 7)-(trifluoromethyl)- (9CI) (CA INDEX NAME)



CC 73-5 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
 Section cross-reference(s): 22, 41, 76
 IT **Electroluminescent** devices
 Fluorescence
 Oscillator strength
 Phosphorescence
 UV and visible spectra
 (long-range energy transfer of singlet and triplet excitations in platinum octaethylporphyrin-doped tris(phenylquinoxaliny)benzene in relation to)
 IT **214132-60-2**
 (long-range energy transfer of singlet and triplet excitations in platinum octaethylporphyrin-doped)

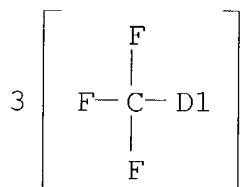
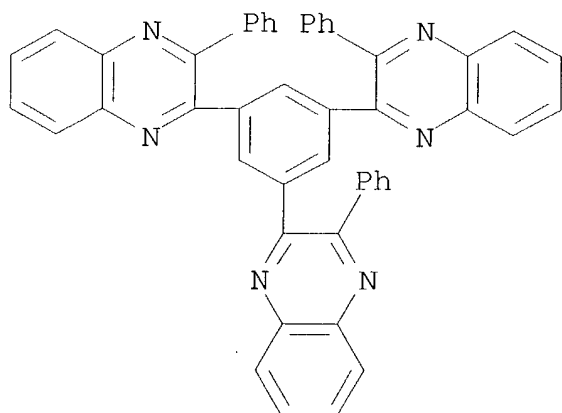
L8 ANSWER 11 OF 23 HCAPLUS COPYRIGHT 2004 ACS on STN
2001:425254 Document No. 135:217862 Quinoxaline films for hetero-layer
light emitting devices. Imperia, Paolo; Schrader,
Sigurd; Casu, Maria Benedetta; Jandke, Markus; Strohriegl, Peter
(Universitat Potsdam, Institut fur Physik LS PKM, Germany). MCLC
S&T, Section B: Nonlinear Optics, 25(1-4), 455-460 (English) 2000.
CODEN: MCLOEB. ISSN: 1058-7268. Publisher: Gordon & Breach Science
Publishers.

AB Hetero-layer devices were realized by combination of hole
transporting materials like polyparaphenylenevinylene (PPV) with new
electron transporting heterocyclic polymers and oligomers:
polyphenylquinoxalines (PPQs) and trisphenylquinoxalines (TPQs),
resp. The PPQ and TPQ, suitable as electron-transporting/hole-
blocking layers in **OLED** devices, were studied by combined
investigations of UPS (UPS), near edge X-ray absorption fine
structure, thermally stimulated discharge currents and dielec.
relaxation spectroscopy. Furthermore, we used semi-empirical
quantum-chem. calcns. to understand the valence electronic structure
of isolated mols. and to interpret the measured UPS spectra.

IT 214132-60-2
(quinoxaline films for hetero-layer **light**
emitting devices)

RN 214132-60-2 HCAPLUS

CN Quinoxaline, 2,2',2''-(1,3,5-benzenetriyl)tris[3-phenyl-6(or
7)-(trifluoromethyl)- (9CI) (CA INDEX NAME)



- CC 73-5 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
- ST quinoxaline film hetero layer **light emitting** device UPS thermally; stimulated film hetero layer **light emitting** device UPS thermally
- IT **Electroluminescent** devices
(org.; quinoxaline films for hetero-layer **light emitting** devices)
- IT Dielectric spectroscopy
Electric transport properties
NEXAFS spectroscopy
Quantum mechanical methods
Thermally stimulated current
UV photoelectron spectroscopy
(quinoxaline films for hetero-layer **light emitting** devices)
- IT 37196-95-5 73935-40-7 **214132-60-2**
(quinoxaline films for hetero-layer **light emitting** devices)
- L8 ANSWER 12 OF 23 HCAPLUS COPYRIGHT 2004 ACS on STN
2001:376209 Document No. 135:217789 Triplet-singlet energy transfer in dye-doped tris(phenylquinoxaline) studied by photoinduced absorption spectroscopy. Blumstengel, S.; Colabella, E.; Borghesi, A.; Tubino,

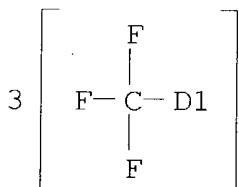
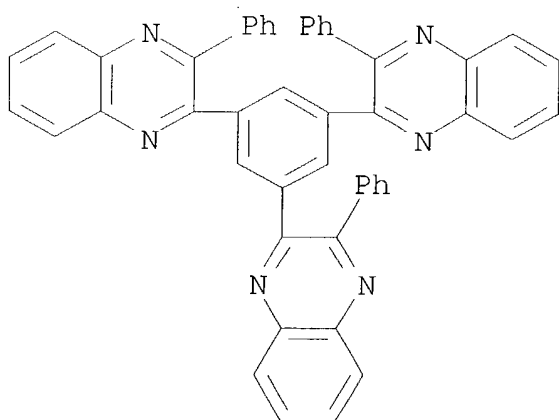
R.; Jandke, M.; Strohriegl, P. (INFM and Dipartimento di Scienza dei Materiali, Universita di Milano-Bicocca, Milan, I-20125, Italy). Synthetic Metals, 121(1-3), 1711-1712 (English) 2001. CODEN: SYMEDZ. ISSN: 0379-6779. Publisher: Elsevier Science S.A..

AB Energy transfer from fluorescent and phosphorescent tris(phenylquinoxaline) to a phosphorescent dye was studied by photoinduced absorption spectroscopy. The frequency response of the donor's triplet-triplet absorption signal was measured to gain information about the tie scale and kinetics of the triplet-singlet energy transfer.

IT 214132-60-2
(triplet-singlet energy transfer in dye-doped tris(phenylquinoxaline) studied by photoinduced absorption spectroscopy)

RN 214132-60-2 HCAPLUS

CN Quinoxaline, 2,2',2''-(1,3,5-benzenetriyl)tris[3-phenyl-6(or 7)-(trifluoromethyl)- (9CI) (CA INDEX NAME)



CC 73-4 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

Section cross-reference(s): 22

IT **Electroluminescent** devices
(org.; triplet-singlet energy transfer in dye-doped tris(phenylquinoxaline) studied by photoinduced absorption

spectroscopy)

IT 214132-60-2
(triplet-singlet energy transfer in dye-doped
tris(phenylquinoxaline) studied by photoinduced absorption
spectroscopy)

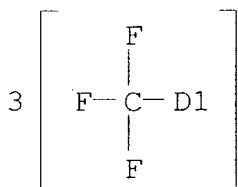
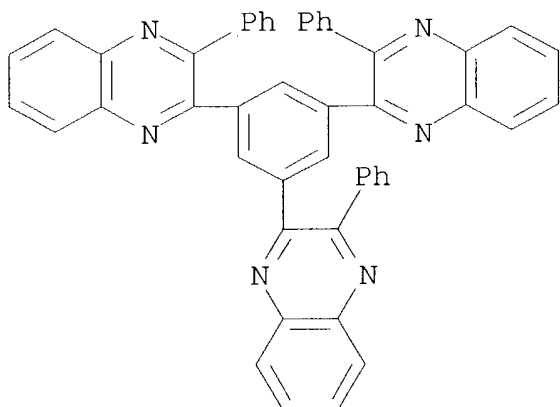
L8 ANSWER 13 OF 23 HCAPLUS COPYRIGHT 2004 ACS on STN
2001:376190 Document No. 135:172764 Electronic transport properties of
heterocyclic materials for heterolayer organic **light**
emitting devices. Imperia, P.; Casu, M. B.; Schrader, S.;
Falk, B.; Jandke, M.; Strohmriegl, P. (Institut fur Physik,
Universitat Potsdam, Potsdam, D-14469, Germany). Synthetic Metals,
121(1-3), 1673-1674 (English) 2001. CODEN: SYMEDZ. ISSN:
0379-6779. Publisher: Elsevier Science S.A..

AB Thermally stimulated processes on films of polyphenylquinoxalines
(PPQs) and trisphenylquinoxalines (TPQs), materials suitable for
electron transport/hole blocking layers on org. **light-**
emitting devices (OLEDs), were studied to get information
about their electronic properties. By using thermally stimulated
luminescence (TSL) curves, the authors estd. the mean trap depths.

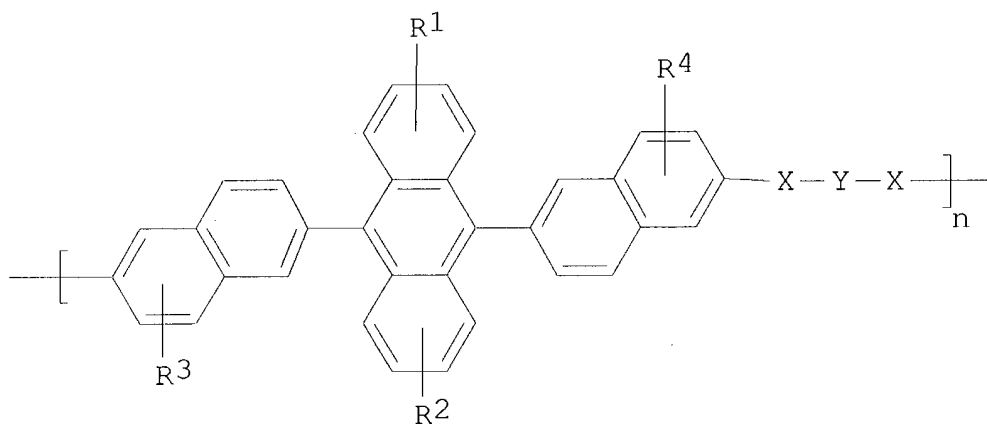
IT 214132-60-2
(electronic transport properties of heterocyclic materials for
heterolayer org. **light emitting** devices)

RN 214132-60-2 HCAPLUS

CN Quinoxaline, 2,2',2''-(1,3,5-benzenetriyl)tris[3-phenyl-6(or
7)-(trifluoromethyl)- (9CI) (CA INDEX NAME)



- CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
Section cross-reference(s): 22, 76
- IT Electric transport properties
Electroluminescent devices
Electronic properties
Stimulated emission
Thermoluminescence
(electronic transport properties of heterocyclic materials for heterolayer org. **light emitting** devices)
- IT 37196-95-5 73935-40-7 **214132-60-2**
(electronic transport properties of heterocyclic materials for heterolayer org. **light emitting** devices)
- L8 ANSWER 14 OF 23 HCAPLUS COPYRIGHT 2004 ACS on STN
2001:297576 Document No. 134:346283 **Electroluminescent** devices having naphthylanthracene-based polymers. Shi, Jianmin; Zheng, Shiyong (Eastman Kodak Company, USA). Eur. Pat. Appl. EP 1094101 A2 20010425, 56 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (English). CODEN: EPXXDW. APPLICATION: EP 2000-203504 20001009. PRIORITY: US 1999-421980 19991020.
- GI



AB **Electroluminescent** devices comprising an anode, a cathode, and polymer luminescent materials disposed between the anode and cathode are described in which the polymeric luminescent materials include 9,10-di-(2-naphthyl)anthracene-based polymers described by the general formula I (R1-4 = independently selected H, alkyl, C1-24 alkoxy, C6-28 (un)substituted aryl, C4-40 (un)substituted heteroaryl, F, Cl, Br, cyano, or nitro groups; X = a linking group; and Y includes ≥ 1 comonomer units that are (un)substituted alkyl, alkenyl, aryl, heteroaryl, or conjugated groups).

IT 337370-55-5 337370-57-7 337370-59-9
337373-23-6 337373-26-9 337373-29-2
337373-31-6

(**electroluminescent** devices using naphthylanthracene-based polymers)

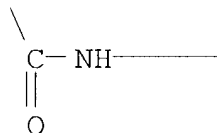
RN 337370-55-5 HCAPLUS

CN Poly[6,2-quinoxalinediyl-1,4-phenylene-2,6-quinoxalinediyliminocarbonyl-2,6-naphthalenediyl[2,6-bis[(2-ethylhexyl)oxy]-9,10-anthracenediyl]-2,6-naphthalenediylcarbonylimino] (9CI) (CA INDEX NAME)

* STRUCTURE DIAGRAM TOO LARGE FOR DISPLAY - AVAILABLE VIA OFFLINE PRINT *

* STRUCTURE DIAGRAM TOO LARGE FOR DISPLAY - AVAILABLE VIA OFFLINE PRINT *

PAGE 2-A

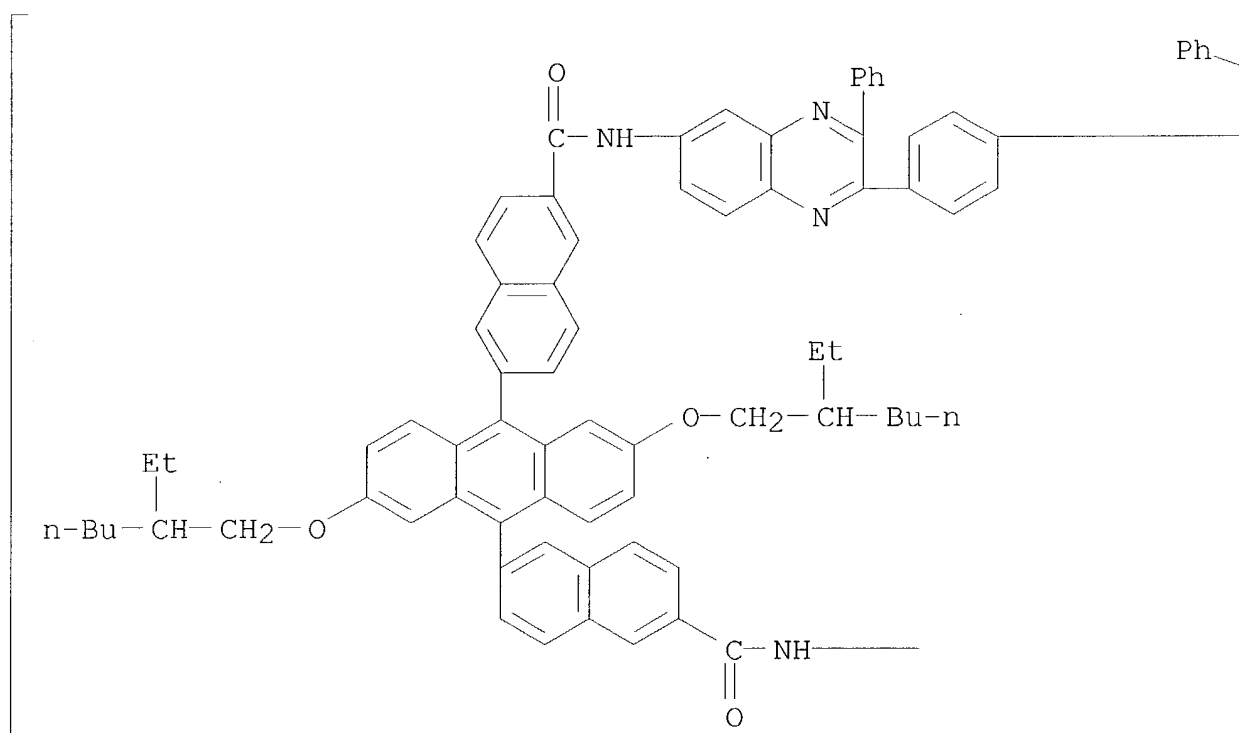


PAGE 2-B

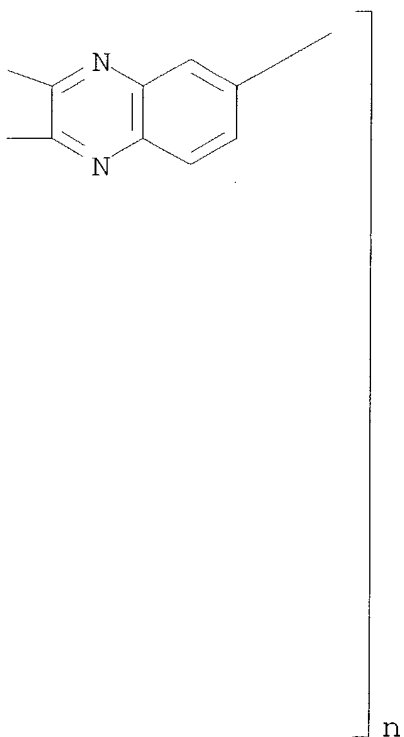
] n

RN 337370-57-7 HCAPLUS
CN Poly[(3-phenyl-6,2-quinoxalinediyl)-1,4-phenylene(3-phenyl-2,6-
quinoxalinediyl)iminocarbonyl-2,6-naphthalenediyl[2,6-bis[(2-
ethylhexyl)oxy]-9,10-anthracenediyl]-2,6-
naphthalenediylcarbonylimino] (9CI) (CA INDEX NAME)

PAGE 1-A



PAGE 1-B



RN 337370-59-9 HCAPLUS
CN Poly[(3-hexyl-6,2-quinoxalinediyl)-1,4-phenylene(3-hexyl-2,6-quinoxalinediyl)iminocarbonyl-2,6-naphthalenediyl[2,6-bis[(2-ethylhexyl)oxy]-9,10-anthracenediyl]-2,6-naphthalenediylcarbonylimino] (9CI) (CA INDEX NAME)

* STRUCTURE DIAGRAM TOO LARGE FOR DISPLAY - AVAILABLE VIA OFFLINE PRINT *

* STRUCTURE DIAGRAM TOO LARGE FOR DISPLAY - AVAILABLE VIA OFFLINE PRINT *

* STRUCTURE DIAGRAM TOO LARGE FOR DISPLAY - AVAILABLE VIA OFFLINE PRINT *

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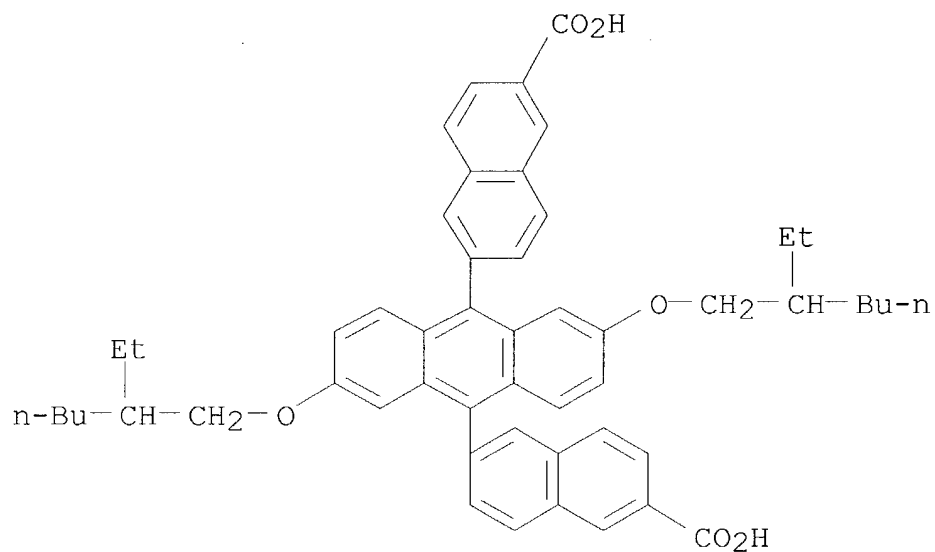
RN 337373-23-6 HCAPLUS

CN 2-Naphthalenecarboxylic acid, 6,6'-[2,6-bis[(2-ethylhexyl)oxy]-9,10-anthracenediyl]bis-, polymer with 2,2'-(1,4-phenylene)bis[6-quinoxalinamine] (9CI) (CA INDEX NAME)

CM 1

CRN 337371-31-0

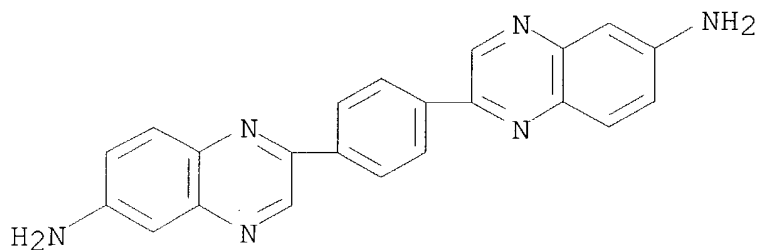
CMF C52 H54 O6



CM 2

CRN 26159-71-7

CMF C22 H16 N6



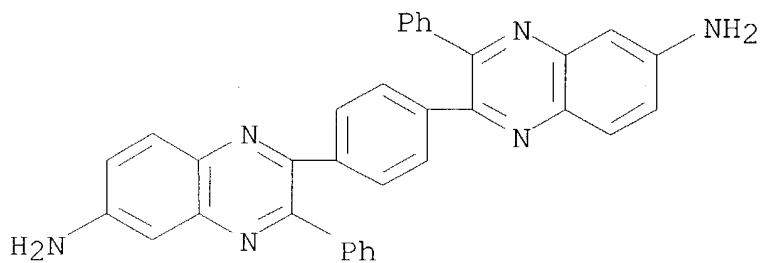
RN 337373-26-9 HCAPLUS

CN 2-Naphthalenecarboxylic acid, 6,6'-[2,6-bis[(2-ethylhexyl)oxy]-9,10-anthracenediyl]bis-, polymer with 2,2'-(1,4-phenylene)bis[3-phenyl-6-quinoxalinamine] (9CI) (CA INDEX NAME)

CM 1

CRN 337373-25-8

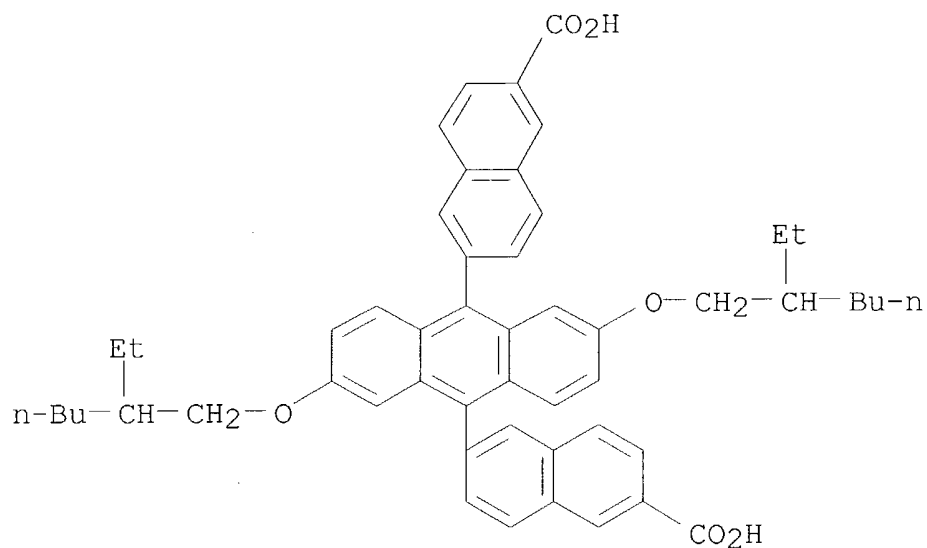
CMF C34 H24 N6



CM 2

CRN 337371-31-0

CMF C52 H54 O6



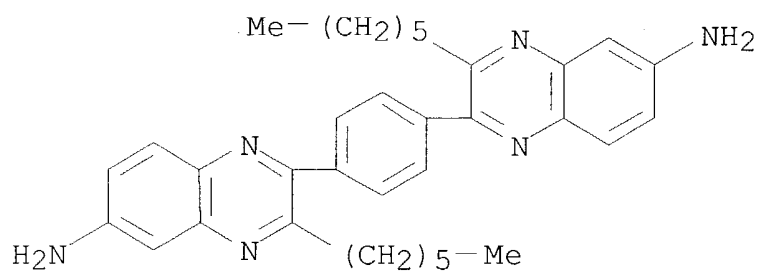
RN 337373-29-2 HCAPLUS

CN 2-Naphthalenecarboxylic acid, 6-[10-(6-carboxy-8-hexyl-2-naphthalenyl)-2,6-bis(1,1-dimethylethyl)-9-anthracenyl]-3-hexyl-, polymer with 2,2'-(1,4-phenylene)bis[3-hexyl-6-quinoxalinamine] (9CI) (CA INDEX NAME)

CM 1

CRN 337373-28-1

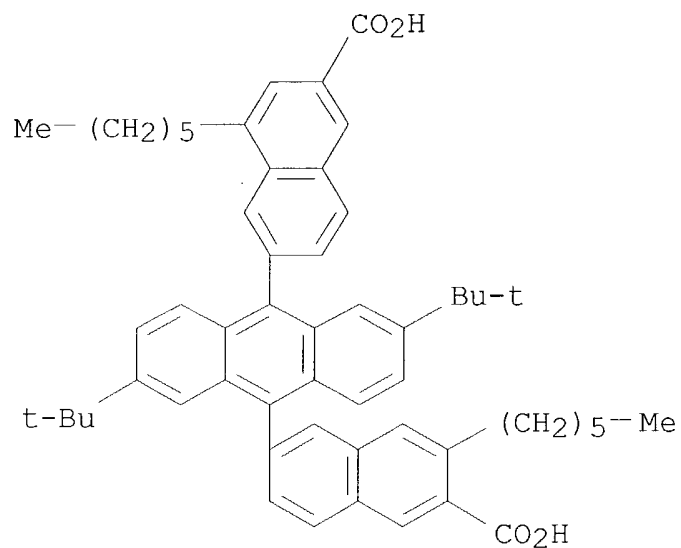
CMF C34 H40 N6



CM 2

CRN 337372-45-9

CMF C56 H62 O4



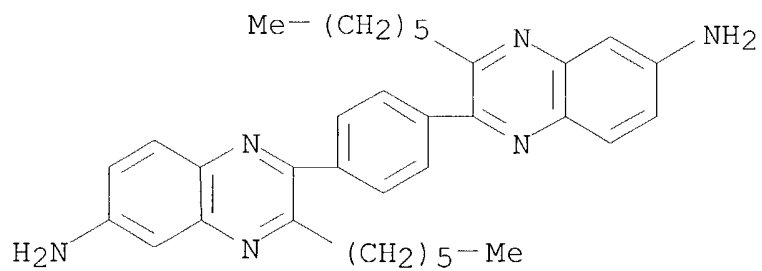
RN 337373-31-6 HCAPLUS

CN 2-Naphthalenecarboxylic acid, 6,6'-[2,6-bis[(2-ethylhexyl)oxy]-9,10-anthracenediyl]bis-, polymer with 2,2'-(1,4-phenylene)bis[3-hexyl-6-quinoxalinamine] (9CI) (CA INDEX NAME)

CM 1

CRN 337373-28-1

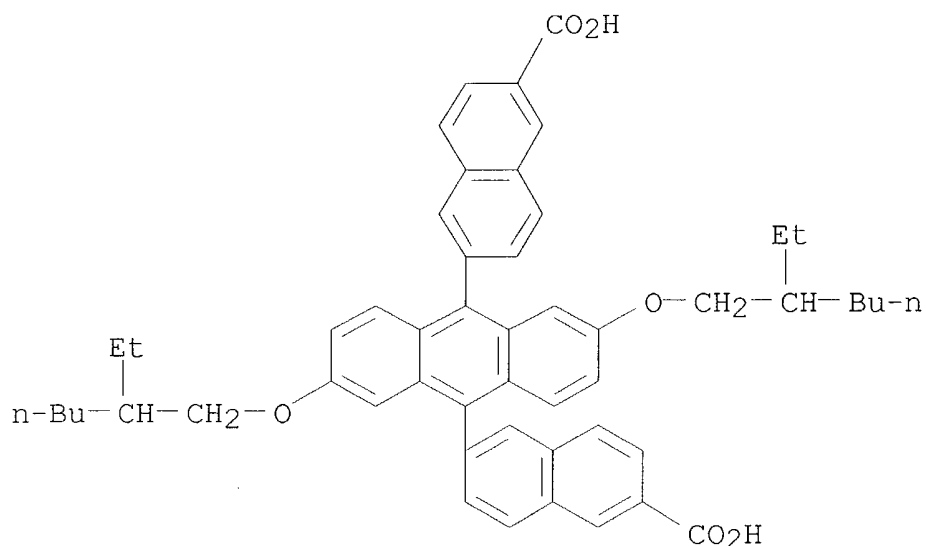
CMF C34 H40 N6



CM 2

CRN 337371-31-0

CMF C52 H54 O6



IC ICM C09K011-06

ICS H05B033-14

CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

Section cross-reference(s): 38, 76

ST naphthyl anthracene polymer **electroluminescent** deviceIT **Electroluminescent** devices

(electroluminescent devices using naphthylanthracene-based polymers)

IT Phosphors

(electroluminescent; electroluminescent

devices using naphthylanthracene-based polymers)

IT	337368-77-1	337368-80-6	337368-87-3	337368-91-9	337368-95-3
	337369-10-5	337369-13-8	337369-16-1	337369-19-4	337369-23-0
	337369-27-4	337369-36-5	337369-46-7	337369-49-0	337369-55-8
	337369-58-1	337369-61-6	337369-64-9	337369-67-2	337369-69-4
	337369-71-8	337369-73-0	337369-75-2	337369-77-4	337369-78-5
	337369-79-6	337369-80-9	337369-82-1	337369-86-5	337369-88-7
	337369-90-1	337369-92-3	337369-94-5	337369-95-6	337369-97-8
	337369-99-0	337370-01-1	337370-03-3	337370-05-5	337370-07-7
	337370-08-8	337370-10-2	337370-12-4	337370-13-5	337370-14-6
	337370-16-8	337370-18-0	337370-20-4	337370-21-5	337370-23-7
	337370-25-9	337370-27-1	337370-29-3	337370-31-7	337370-33-9
	337370-35-1	337370-37-3	337370-39-5	337370-41-9	337370-43-1
	337370-45-3	337370-47-5	337370-49-7	337370-51-1	337370-53-3
	337370-55-5	337370-57-7	337370-59-9		
	337370-69-1	337370-72-6	337370-75-9	337370-78-2	337370-84-0
	337370-87-3	337370-90-8	337370-93-1	337370-97-5	337371-00-3
	337371-01-4	337371-04-7	337371-08-1	337371-10-5	337371-11-6

337371-13-8	337371-14-9	337371-16-1	337371-18-3	337371-20-7
337371-24-1	337371-26-3	337371-29-6	337371-32-1	337371-35-4
337371-38-7	337371-40-1	337371-42-3	337371-45-6	337371-47-8
337371-49-0	337371-52-5	337371-55-8	337371-59-2	337371-63-8
337371-66-1	337371-69-4	337371-71-8	337371-76-3	337371-78-5
337371-80-9	337371-82-1	337371-86-5	337371-87-6	337371-88-7
337371-92-3	337371-96-7	337371-97-8	337371-99-0	337372-02-8
337372-05-1	337372-09-5	337372-12-0	337372-15-3	337372-19-7
337372-22-2	337372-25-5	337372-28-8	337372-32-4	337372-35-7
337372-37-9	337372-40-4	337372-43-7	337372-47-1	337372-50-6
337372-52-8	337372-55-1	337372-57-3	337372-60-8	337372-63-1
337372-65-3	337372-67-5	337372-70-0	337372-73-3	337372-76-6
337372-79-9	337372-81-3	337372-83-5	337372-86-8	337372-88-0
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337460-19-2	337460-20-5	337460-23-8	337460-24-9	337460-25-0
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337460-57-8	337460-58-9	337460-62-5	337460-63-6	337460-69-2
337460-71-6	337460-72-7	337460-75-0	337460-76-1	337460-77-2
337460-78-3	337460-79-4	337460-97-6	337461-03-7	337461-04-8
337461-06-0				

(electroluminescent devices using naphthylanthracene-based polymers)

IT	337461-07-1	337461-08-2	337461-09-3	337461-10-6	337461-11-7
	337461-13-9	337461-14-0	337461-15-1	337461-16-2	337461-18-4
	337461-19-5	337461-20-8	337461-21-9	337461-22-0	337461-24-2
	337461-25-3	337461-26-4	337463-04-4	337463-67-9	337464-26-3
	337464-27-4	337464-28-5	337464-29-6	337464-30-9	337464-31-0
	337464-32-1	337464-44-5	337464-45-6	337464-46-7	337464-47-8
	337464-48-9	337464-60-5	337464-61-6	337465-00-6	337465-01-7
	337465-03-9	337465-04-0	337465-12-0	337465-14-2	337465-16-4
	337465-17-5	337465-19-7	337465-22-2	337465-23-3	337465-44-8
	337465-45-9	337465-98-2			

(electroluminescent devices using naphthylanthracene-based polymers)

IT	337368-83-9P	337368-99-7P	337369-03-6P	337369-07-0P
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337369-31-0P 337369-41-2P 337369-52-5P 337369-84-3P
 337370-80-6P 337371-21-8P 337371-74-1P

(**electroluminescent** devices using naphthylanthracene-based polymers)

IT 18798-85-1P 18800-99-2P 62375-58-0P 99964-58-6P 106679-32-7P
 235099-48-6P 332083-42-8P 332083-43-9P 332083-44-0P
 332083-45-1P 332083-46-2P 337369-40-1P 337370-61-3P
 337370-62-4P 337370-63-5P

(**electroluminescent** devices using naphthylanthracene-based polymers)

IT 84-60-6, 2,6-Dihydroxyanthraquinone 98-06-6, tert-Butyl benzene
 106-89-8, Epichlorohydrin, reactions 121-43-7, Trimethyl borate
 126-30-7, 2,2-Dimethylpropane-1,3-diol 143-15-7, 1-Bromododecane
 523-27-3, 9,10-Dibromoanthracene 628-13-7, Pyridine hydrochloride
 5111-65-9, 2-Bromo-6-methoxy naphthalene 7439-95-4, Magnesium,
 reactions 15231-91-1, 6-Bromo-2-hydroxynaphthalene 18908-66-2,
 2-Ethylhexyl bromide 25620-62-6, Dibromoethane 32703-79-0

(**electroluminescent** devices using naphthylanthracene-based polymers)

IT 38046-82-1P
 (**electroluminescent** devices using naphthylanthracene-based polymers)

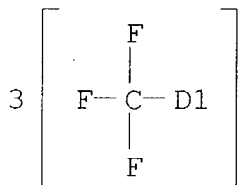
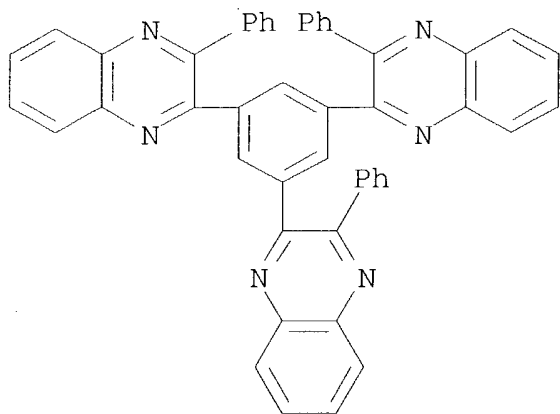
L8 ANSWER 15 OF 23 HCAPLUS COPYRIGHT 2004 ACS on STN

2000:819765 Document No. 134:92846 Luminescence properties and energy transfer processes in fluorescent and phosphorescent tris(phenylquinoxaline). Blumstengel, Sylke; Colabella, Elio; Tubino, Riccardo; Jandke, M.; Strohhriegl, P. (INFN and Dipartimento di Scienza dei Materiali, Universita di Milano-Bicocca, Milan, 20125, Italy). Materials Research Society Symposium Proceedings, 598(Electrical, Optical, and Magnetic Properties of Organic Solid-State Materials V), BB3.32/1-BB3.32/6 (English) 2000. CODEN: MRSPDH. ISSN: 0272-9172. Publisher: Materials Research Society.

AB The authors have studied the photophys. properties and energy transfer processes in tris(phenylquinoxalines) (TPQ). TPQs emit blue fluorescence with a max. at 2.9 eV as well as green phosphorescence at 2.2 eV. When doped with a phosphorescent dye efficient energy transfer takes place from the excited singlet and triplet state of the TPQ host to the guest mols. The mechanism of energy transfer can be understood in the frame of Forster's theory of dipole-dipole interaction. Besides the interesting photophys. properties, TPQs are also very efficient electron transport materials. Red **light-emitting** diodes using doped TPQ as emitter and electron transport layer were prepd. and **electroluminescence** properties studied.

IT 214132-60-2
 (luminescence properties and energy transfer processes in fluorescent and phosphorescent tris(phenylquinoxaline))

RN 214132-60-2 HCAPLUS
 CN Quinoxaline, 2,2',2''-(1,3,5-benzenetriyl)tris[3-phenyl-6(or
 7)-(trifluoromethyl)- (9CI) (CA INDEX NAME)



CC 73-5 (Optical, Electron, and Mass Spectroscopy and Other Related
 Properties)
 ST phosphorescent dye doped phenylquinoxaline luminescence
electroluminescence energy transfer
 IT Luminescence, **electroluminescence**
 (of red **light-emitting** diodes using doped
 tris(phenylquinoxaline) as emitter and electron transport layer)
 IT **214132-60-2**
 (luminescence properties and energy transfer processes in
 fluorescent and phosphorescent tris(phenylquinoxaline))

L8 ANSWER 16 OF 23 HCAPLUS COPYRIGHT 2004 ACS on STN
 2000:462260 Document No. 133:288499 Organic **light-**
emitting devices based on new heterocyclic compounds.
 Schrader, Sigurd K.; Imperia, Paolo; Koch, Norbert; Leising,
 Guenther; Falk, B. (Institute of Physics, Dep. Condensed Matter
 Phys., Univ. Potsdam, Potsdam, Germany). Proceedings of SPIE-The
 International Society for Optical Engineering, 3797(Organic
 Light-Emitting Materials and Devices III), 209-220 (English) 1999.
 CODEN: PSISDG. ISSN: 0277-786X. Publisher: SPIE-The International

Society for Optical Engineering.

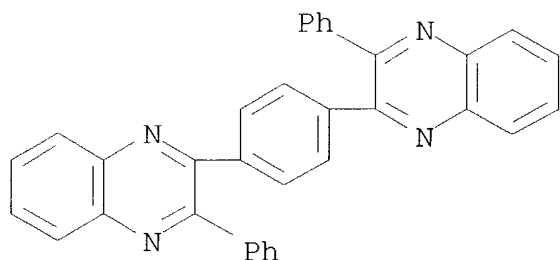
AB One approach to increase the overall performance of org. **light emitting** devices is to sep. the **light-emitting** vol. from the ones which are assigned to charge injection or transport. The authors realized such polymer hetero-layer structures by combination of hole transporting materials like polyparaphenylenevinylene (PPV) with new electron transporting materials, i.e. heterocyclic polymers and heterocyclic low mol. compds., esp. Ph quinoxalines (PQs). The electronic properties of these heterocyclic compds. were studied by various methods including UPS. PQs show electron affinities near 3.5 eV and ionization potentials <6 eV. Measurements of thermally stimulated depolarization currents (TSDC) were carried out to study both dipolar relaxation and charge transport processes in single layer devices. The TSDC spectra revealed the prominence of both dipolar relaxation and of charge transport processes. The dipolar processes show activation energies between 0.4 eV and 1 eV which are typical values for small relaxing entities like polymer side groups. Current-voltage and current-luminance characteristics were used to study the prepd. heterolayer devices. Double layers made of PPV and polyphenylquinoxaline (PPQ) were characterized by low onset voltages near 2 V and high luminous efficiency of >0.8 cd/A. PPQs are promising materials in the field of org. **electroluminescence**

IT 41758-31-0 236392-92-0

(org. **light-emitting** devices based on new heterocyclic compds.)

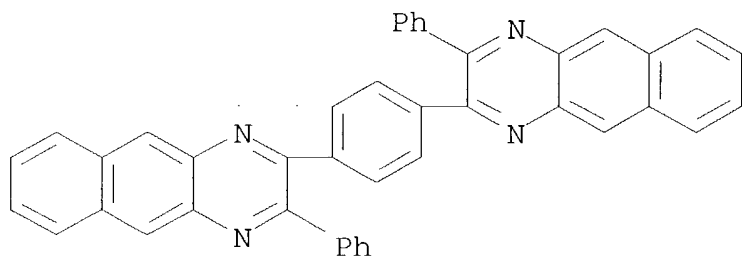
RN 41758-31-0 HCAPLUS

CN Quinoxaline, 2,2'-(1,4-phenylene)bis[3-phenyl- (9CI) (CA INDEX NAME)



RN 236392-92-0 HCAPLUS

CN Benzo[g]quinoxaline, 2,2'-(1,4-phenylene)bis[3-phenyl- (9CI) (CA INDEX NAME)



CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

IT Band gap
(optical; org. **light-emitting** devices based on new heterocyclic compds.)

IT **Electroluminescent** devices
Electron affinity
Ionization potential
Thermally stimulated depolarization current
UV photoelectron spectra
(org. **light-emitting** devices based on new heterocyclic compds.)

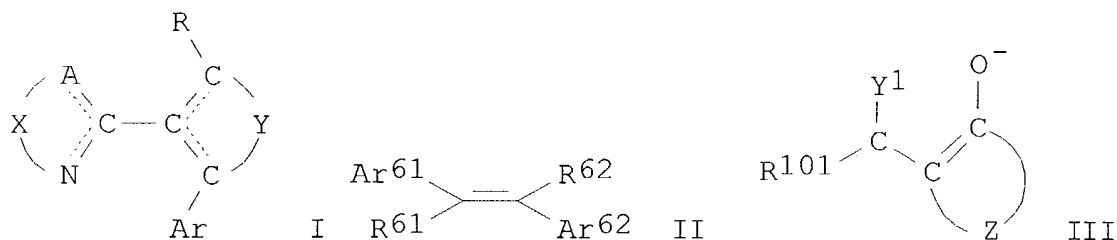
IT Heterocyclic compounds
(org. **light-emitting** devices based on new heterocyclic compds.)

IT 73935-40-7 75855-89-9
(org. **light-emitting** devices based on new heterocyclic compds.)

IT 16111-01-6 41758-31-0 236392-92-0
(org. **light-emitting** devices based on new heterocyclic compds.)

L8 ANSWER 17 OF 23 HCAPLUS COPYRIGHT 2004 ACS on STN
2000:441449 Document No. 133:81409 **Electroluminescent** material, **electroluminescent** element and color conversion filter. Kita, Hiroshi; Suzuri, Yoshiyuki; Yamada, Taketoshi; Nakamura, Kazuaki; Ueda, Noriko; Okubo, Yasushi (Konica Corporation, Japan). Eur. Pat. Appl. EP 1013740 A2 20000628, 80 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (English). CODEN: EPXXDW. APPLICATION: EP 1999-125813 19991223. PRIORITY: JP 1998-370452 19981225; JP 1999-246404 19990831.

GI



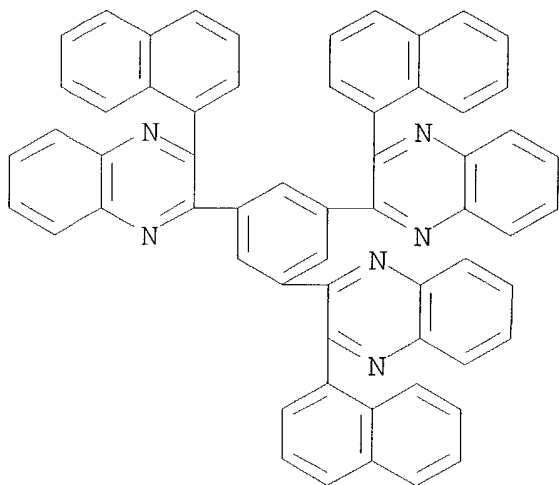
AB **Electroluminescent** materials are described which are based on derivs. of arom. heterocycles, binaphthyls, and triarylamines which include substituents (esp. biaryl substituents) contg. bonds capable of giving internal rotational isomerism, or on compds. described by the general formulas I (Ar = aryl; A = C, N, S or O; X = group of atoms necessary to form 5- or 6-member N contg. arom. heterocyclic ring; Y = group of atoms necessary to form 5- or 6-member arom. hydrocarbon or arom. heterocyclic ring, provided that the bond of C-N, C-A or C-C in the formula is a single or double bond; and R = H, substituent, or Ar) or II (Ar61 and Ar62 = each aryl or arom. heterocyclic; R61 and R62 = each H or substituent, provided that ≥ 1 of Ar61, Ar62, R61, and R62 = biaryl group contg. a bond capable of giving internal rotational isomerism or a group contg. such a biaryl group); rare earth metal complex fluorescent substances contg. at least an anionic ligand represented by the formula III (R101 = H or substituent; Y1 = O, S or N(R102); R102 = H or substituent; and Z = atoms forming a 4- to 8-membered ring) are also described. **Electroluminescent** elements comprising an **electroluminescent** material and a fluorescent substance **emitting light** having an **emission max.** at the wavelength different from that of **light emitted** from the **electroluminescent** material upon absorption of the **light emitted** from the **electroluminescent** material are also described, as are color conversion filters comprising a fluorescent substance **emitting light** having an **emission max.** at 400-700 nm upon absorption of the **light emitted** from the **electroluminescent** material.

IT 278611-23-7

(**electroluminescent** materials based on compds. including substituents with internal rotation isomers and rare earth complex-based fluorescent materials and **electroluminescent** elements and color conversion filters)

RN 278611-23-7 HCAPLUS

CN Quinoxaline, 2,2',2''-(1,3,5-benzenetriyl)tris[3-(1-naphthalenyl)-(9CI) (CA INDEX NAME)



- IC ICM C09K011-06
ICS H05B033-14; G02B005-20
- CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
Section cross-reference(s): 76
- ST **electroluminescent** compd internal rotation isomer
substituent; **electroluminescent** device; rare earth complex
fluorescent material color conversion filter
- IT **Electroluminescent** devices
 Electroluminescent devices
 Fluorescent substances
 Optical filters
 (**electroluminescent** materials based on compds.
 including substituents with internal rotation isomers and rare
 earth complex-based fluorescent materials and
 electroluminescent elements and color conversion filters)
- IT Phosphors
 (**electroluminescent**; **electroluminescent**
 materials based on compds. including substituents with internal
 rotation isomers and rare earth complex-based fluorescent
 materials and **electroluminescent** elements and color
 conversion filters)
- IT 135-70-6, p-Quaterphenyl 2085-33-8, Tris(8-
hydroxyquinolinato)aluminum 50926-11-9, Indium tin oxide
65181-78-4, N,N'-Diphenyl-N,N'-bis(3-methylphenyl)-1,1'-biphenyl-
4,4'-diamine 73364-01-9 78732-97-5 96761-79-4,
5,5'-Bi-1,10-phenanthroline 100294-74-4 219843-55-7
278601-15-3 278601-34-6 278610-55-2 278610-56-3 278610-58-5
278610-92-7 278610-94-9 278610-95-0 278610-97-2 278611-00-0
278611-01-1 278611-03-3 278611-05-5 278611-09-9 278611-10-2

278611-11-3 278611-12-4 278611-13-5 278611-15-7 278611-16-8
278611-23-7 278611-25-9 278611-26-0 278611-27-1
 278611-28-2 278611-29-3 278611-30-6 278611-31-7 278611-33-9
 278794-68-6 278794-70-0 278794-72-2 278794-73-3 278794-75-5
 278794-77-7

(**electroluminescent** materials based on compds.
 including substituents with internal rotation isomers and rare
 earth complex-based fluorescent materials and
electroluminescent elements and color conversion filters)

IT 78-10-4 2602-34-8, γ -Glycidoxypolytriethoxysilane
 10022-31-8, Barium nitrate 14284-86-7, Europium (III)
 acetylacetonate

(**electroluminescent** materials based on compds.
 including substituents with internal rotation isomers and rare
 earth complex-based fluorescent materials and
electroluminescent elements and color conversion filters)

IT 49610-33-5P

(**electroluminescent** materials based on compds.
 including substituents with internal rotation isomers and rare
 earth complex-based fluorescent materials and
electroluminescent elements and color conversion filters)

IT 12254-04-5, Barium magnesium aluminate (BaMgAl₁₀O₁₇) 13566-12-6,
 Yttrium vanadate (YVO₄)

(europium-activated; **electroluminescent** materials based
 on compds. including substituents with internal rotation isomers
 and rare earth complex-based fluorescent materials and
electroluminescent elements and color conversion filters)

IT 13778-49-9P, Barium silicate (Ba₂SiO₄)

(europium-activated; **electroluminescent** materials based
 on compds. including substituents with internal rotation isomers
 and rare earth complex-based fluorescent materials and
electroluminescent elements and color conversion filters)

IT 7440-53-1P, Europium, uses 16910-54-6P, Europium +2, uses
 (phosphors activated by; **electroluminescent** materials
 based on compds. including substituents with internal rotation
 isomers and rare earth complex-based fluorescent materials and
electroluminescent elements and color conversion filters)

IT 22541-18-0, Europium +3, uses
 (phosphors activated by; **electroluminescent** materials
 based on compds. including substituents with internal rotation
 isomers and rare earth complex-based fluorescent materials and
electroluminescent elements and color conversion filters)

L8 ANSWER 18 OF 23 HCAPLUS COPYRIGHT 2004 ACS on STN
 1999:456291 Document No. 131:191798 Novel low-molar-mass glasses for
 photorefractive and **electroluminescent** applications.
 Hohle, C.; Jandke, M.; Schlöter, S.; Koch, N.; Resel, R.; Haarer,
 D.; Strohmriegel, P. (Makromolekulare Chemie I and Bayreuther Institut

fur Makromolekulforschung (BIMF), Universitat Bayreuth, Bayreuth, D-95440, Germany). Synthetic Metals, 102(1-3), 1535-1536 (English) 1999. CODEN: SYMEDZ. ISSN: 0379-6779. Publisher: Elsevier Science S.A..

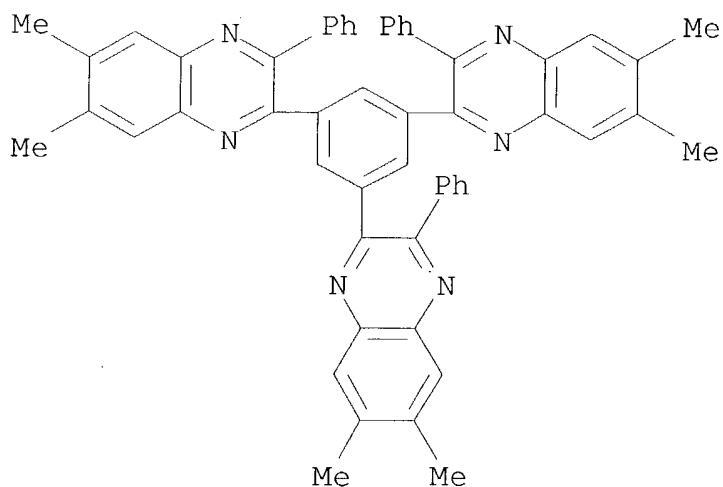
AB A no. of org. glass forming starburst mols. have been synthesized and characterized with regard to their thermal and optical properties. Photorefractivity is obsd. and discussed within triphenylamine derivs. substituted with an NLO-chromophore. The tuning of glass forming properties in novel phenylquinoxaline glasses and their use as electron transport materials for OLEDs is presented.

IT 203915-07-5 214132-60-2 238753-75-8

(novel low-molar-mass glasses for photorefractive and **electroluminescent** applications)

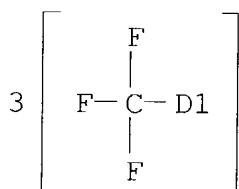
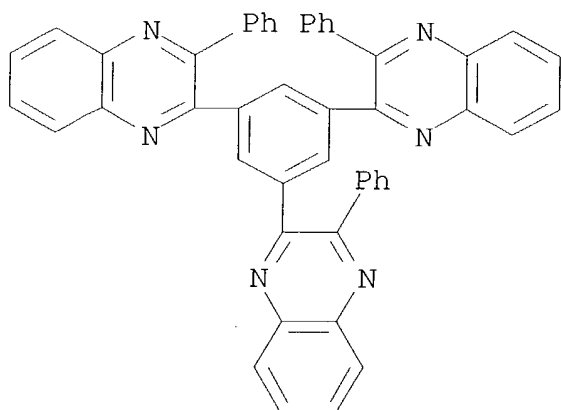
RN 203915-07-5 HCAPLUS

CN Quinoxaline, 2,2',2''-(1,3,5-benzenetriyl)tris[6,7-dimethyl-3-phenyl-(9CI) (CA INDEX NAME)



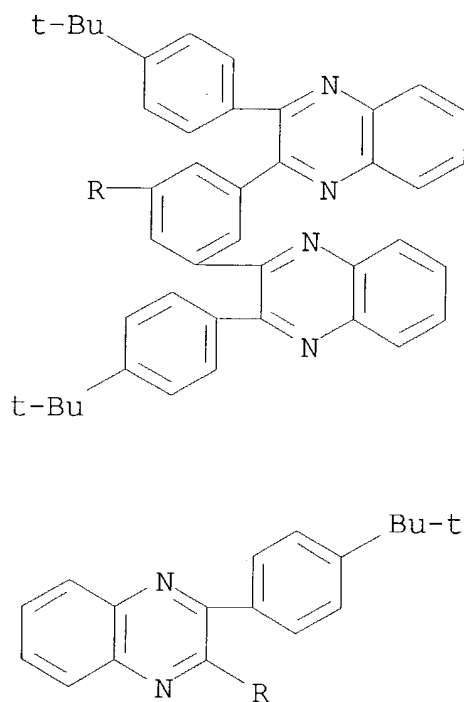
RN 214132-60-2 HCAPLUS

CN Quinoxaline, 2,2',2''-(1,3,5-benzenetriyl)tris[3-phenyl-6(or 7)-(trifluoromethyl)- (9CI) (CA INDEX NAME)

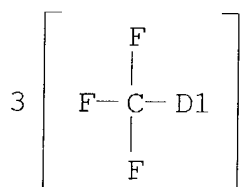


RN 238753-75-8 HCAPLUS
 CN Quinoxaline, 2,2',2''-(1,3,5-benzenetriyl)tris[3-[4-(1,1-dimethylethyl)phenyl](trifluoromethyl)-(9CI) (CA INDEX NAME)

PAGE 1-A



PAGE 2-A



- CC 74-13 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
 Section cross-reference(s): 73
- ST photorefractive **electroluminescence** phenylquinoxaline
 nonlinear optical method org glass
- IT **Electroluminescent** devices
 Optical properties
 Photorefractive effect
 (novel low-molar-mass glasses for photorefractive and **electroluminescent** applications)
- IT Organic glasses

(novel low-molar-mass glasses for photorefractive and **electroluminescent** applications)

IT 198827-73-5 203915-07-5 214132-60-2
220288-06-2 220288-07-3 220288-08-4 238753-75-8
240126-07-2

(novel low-molar-mass glasses for photorefractive and **electroluminescent** applications)

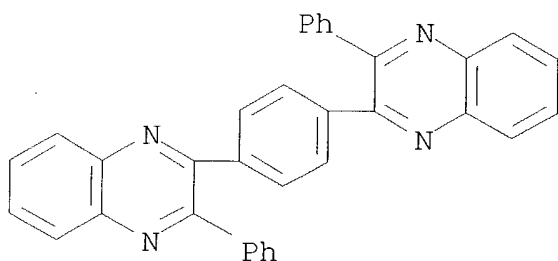
L8 ANSWER 19 OF 23 HCAPLUS COPYRIGHT 2004 ACS on STN
1999:456066 Document No. 131:150949 Ultraviolet photoelectron spectroscopic study of heterocyclic model compounds for **electroluminescent** devices. Schurmann, H.; Koch, N.; Imperia, P.; Schrader, S.; Jandke, M.; Strohmriegl, P.; Schulz, B.; Leising, G.; Brehmer, L. (FB Physik, Universitat Osnabruck, Osnabruck, D-14567, Germany). Synthetic Metals, 102(1-3), 1069-1070 (English) 1999. CODEN: SYMEDZ. ISSN: 0379-6779. Publisher: Elsevier Science S.A..

AB One approach to increase the overall performance of org. **light emitting** devices is to sep. the **light-emitting** vol. from the ones which are assigned to charge injection or transport. The electronic properties of model heterocyclic compds., namely low mol. phenylquinoxalines and related derivs., for electron transport layers have been investigated by UPS. The ionization potentials of these materials have been detd.

IT 41758-31-0, 1,4-Bis[2-(3-phenylquinoxalyl)]benzene
236392-92-0, 1,4-Bis[2-(3-phenylbenzo[g]quinoxalyl)]benzene
(electronic properties of model heterocyclic compds. for application as hole blocking layers of **electroluminescent** devices)

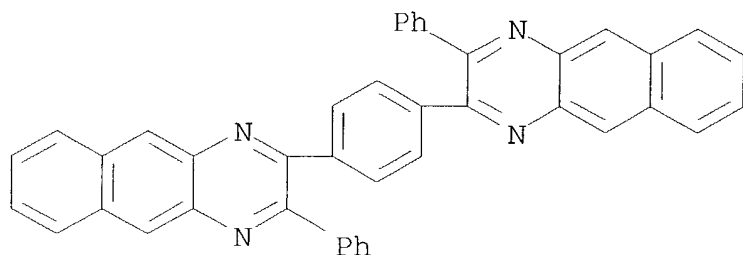
RN 41758-31-0 HCAPLUS

CN Quinoxaline, 2,2'-(1,4-phenylene)bis[3-phenyl- (9CI) (CA INDEX NAME)



RN 236392-92-0 HCAPLUS

CN Benzo[g]quinoxaline, 2,2'-(1,4-phenylene)bis[3-phenyl- (9CI) (CA INDEX NAME)



- CC 73-6 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
Section cross-reference(s): 74, 76
- ST electronic properties heterocyclic model compd
electroluminescent device; ionization potential heterocyclic model compd **electroluminescent** device
- IT **Electroluminescent** devices
Ionization potential
UV photoelectron spectra
Valence band
(electronic properties of model heterocyclic compds. for application as hole blocking layers of **electroluminescent** devices)
- IT Band gap
(optical; electronic properties of model heterocyclic compds. for application as hole blocking layers of **electroluminescent** devices)
- IT 16111-01-6, 2,2',3,3'-Tetraphenyl-6,6'-diquinoxaline
41758-31-0, 1,4-Bis[2-(3-phenylquinoxalyl)]benzene
236392-92-0, 1,4-Bis[2-(3-phenylbenzo[g]quinoxalyl)]benzene
(electronic properties of model heterocyclic compds. for application as hole blocking layers of **electroluminescent** devices)
- L8 ANSWER 20 OF 23 HCAPLUS COPYRIGHT 2004 ACS on STN
1999:400159 Document No. 131:177087 Electron transport in starburst phenylquinoxalines. Redecker, M.; Bradley, D. D. C.; Jandke, M.; Strohmriegl, P. (Department of Physics and Astronomy and Center for Molecular Materials, The University of Sheffield, Sheffield, S3 7RH, UK). Applied Physics Letters, 75(1), 109-111 (English) 1999. CODEN: APPLAB. ISSN: 0003-6951. Publisher: American Institute of Physics.
- AB The electron transport properties of 2 sol. tris-phenylquinoxalines have been studied by the time-of-flight technique. The electron mobilities for both compds. approach 10^{-4} cm²/V s at elec. fields of 106 V/cm at room temp. These are high values for isotropic electron

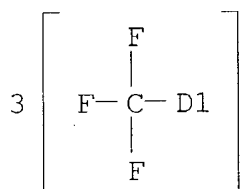
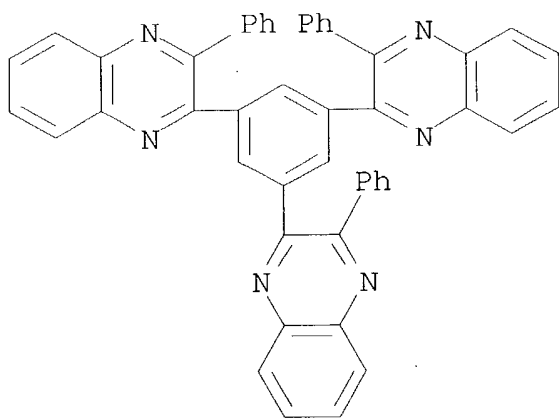
transport materials suitable for use in org. LEDs.

IT **214132-60-2 238753-75-8**

(electron transport in starburst phenylquinoxalines)

RN 214132-60-2 HCAPLUS

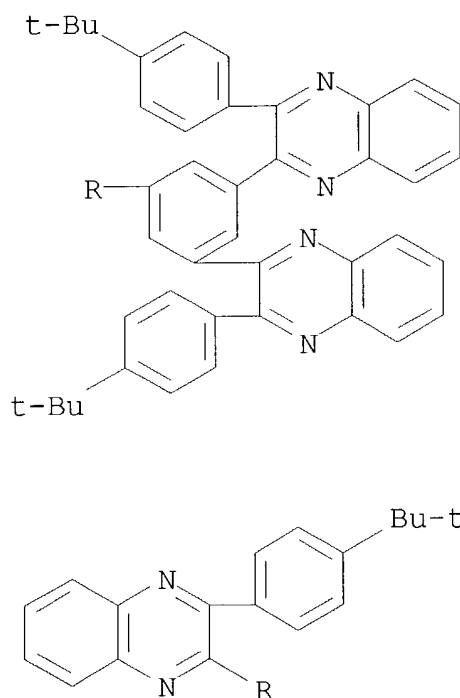
CN Quinoxaline, 2,2',2''-(1,3,5-benzenetriyl)tris[3-phenyl-6(or 7)-(trifluoromethyl)- (9CI) (CA INDEX NAME)



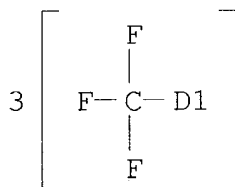
RN 238753-75-8 HCAPLUS

CN Quinoxaline, 2,2',2''-(1,3,5-benzenetriyl)tris[3-[4-(1,1-dimethylethyl)phenyl](trifluoromethyl)- (9CI) (CA INDEX NAME)

PAGE 1-A



PAGE 2-A



CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

Section cross-reference(s): 76

IT **Electroluminescent** devices

(electron transport in starburst phenylquinoxalines suitable for use as)

IT **214132-60-2 238753-75-8**

(electron transport in starburst phenylquinoxalines)

L8 ANSWER 21 OF 23 HCAPLUS COPYRIGHT 2004 ACS on STN

1998:572945 Document No. 129:290672 Phenylquinoxaline Polymers and Low

Molar Mass Glasses as Electron-Transport Materials in Organic **Light-Emitting** Diodes. Jandke, Markus; Strohmriegl, Peter; Berleb, Stefan; Werner, Ekkehard; Bruetting, Wolfgang (Makromolekulare Chemie I and Bayreuther Institut, Universitaet Bayreuth, Bayreuth, 95440, Germany). *Macromolecules*, 31(19), 6434-6443 (English) 1998. CODEN: MAMOBX. ISSN: 0024-9297. Publisher: American Chemical Society.

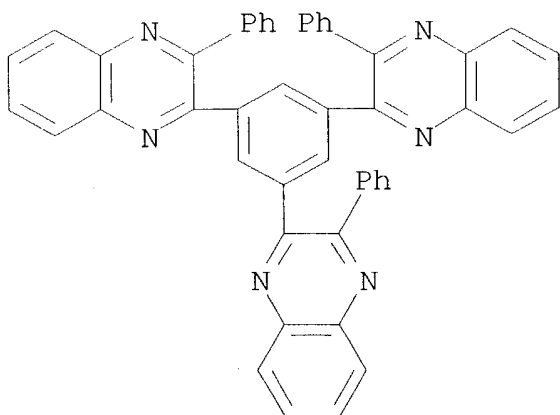
AB A new synthetic approach to both phenylquinoxaline polymers and low molar mass glasses is developed. A palladium-catalyzed coupling of arylalkynes and bromobenzenes and subsequent oxidn. of the triple bonds leads to the corresponding benziles. Reaction with diaminobenzidine yields poly(phenylquinoxalines) (PPQs), whereas the reaction with 1,2-diaminobenzenes leads to low molar mass bis(phenylquinoxalines) (BPQs) and tris(phenylquinoxalines) (TPQs). Both PPQs and TPQs carry tert-Bu or CF₃ substituents and are fully sol. in chlorinated hydrocarbons. The starburst TPQs are able to form stable, low molar mass glasses. Cyclic voltammetry reveals that the TPQs have low-lying lowest unoccupied MOs levels at about -3.6 eV and are attractive as electron-transport materials in org. **light-emitting** diodes (LEDs). Two-layer LEDs with poly(phenylenevinylene) were fabricated that show a max. brightness of 450 cd/m².

IT 203915-06-4P 213965-06-1P 213965-07-2P
213965-12-9P 214132-59-9P 214132-60-2P

(synthesis of phenylquinoxaline low molar mass glasses as electron-transport materials in org. **light-emitting** diodes)

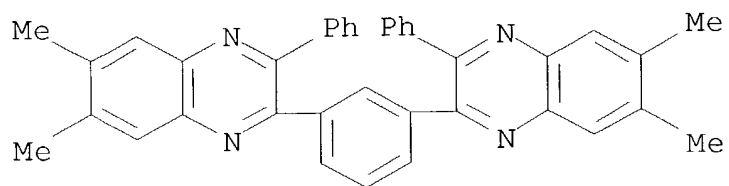
RN 203915-06-4 HCAPLUS

CN Quinoxaline, 2,2',2''-(1,3,5-benzenetriyl)tris[3-phenyl- (9CI) (CA INDEX NAME)

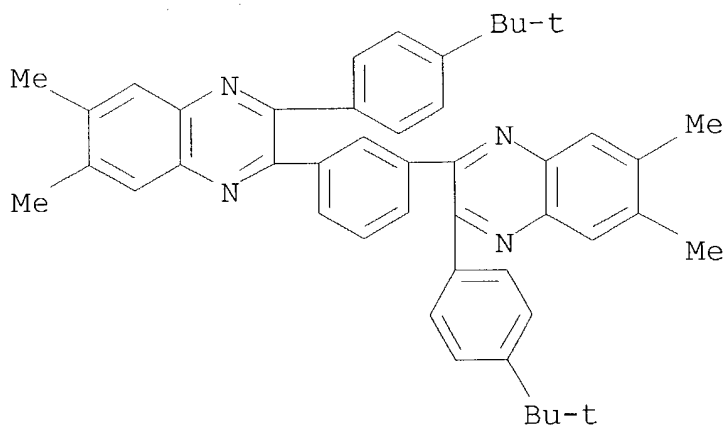


RN 213965-06-1 HCAPLUS

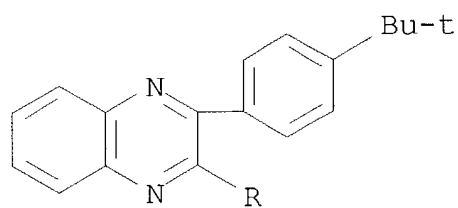
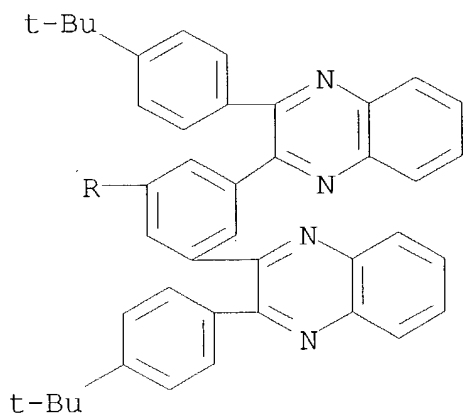
CN Quinoxaline, 2,2'-(1,3-phenylene)bis[6,7-dimethyl-3-phenyl- (9CI)
(CA INDEX NAME)



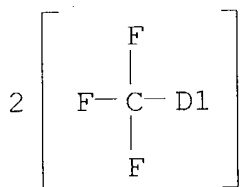
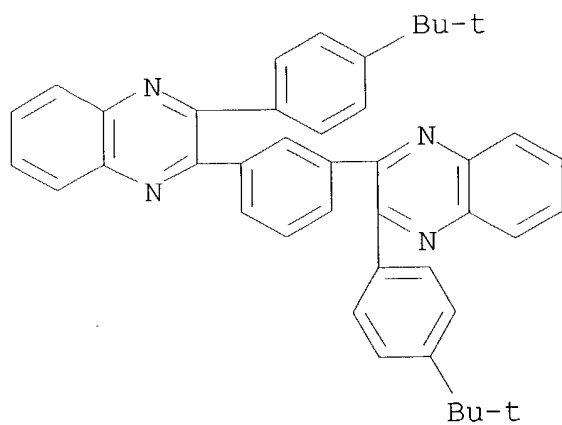
RN 213965-07-2 HCAPLUS
CN Quinoxaline, 2,2'-(1,3-phenylene)bis[3-[4-(1,1-dimethylethyl)phenyl]-
6,7-dimethyl- (9CI) (CA INDEX NAME)



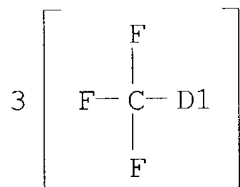
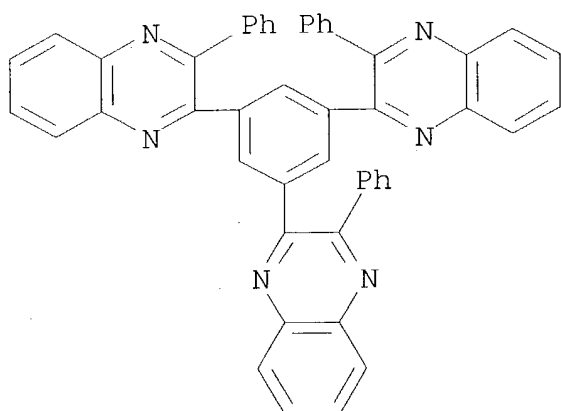
RN 213965-12-9 HCAPLUS
CN Quinoxaline, 2,2',2'''-(1,3,5-benzenetriyl)tris[3-[4-(1,1-
dimethylethyl)phenyl]- (9CI) (CA INDEX NAME)



RN 214132-59-9 HCAPLUS
CN Quinoxaline, 2,2'-(1,3-phenylene)bis[3-[4-(1,1-dimethylethyl)phenyl]-
6(or 7)-(trifluoromethyl)- (9CI) (CA INDEX NAME)



RN 214132-60-2 HCAPLUS
 CN Quinoxaline, 2,2',2'''-(1,3,5-benzenetriyl)tris[3-phenyl-6(or
 7)-(trifluoromethyl)- (9CI) (CA INDEX NAME)

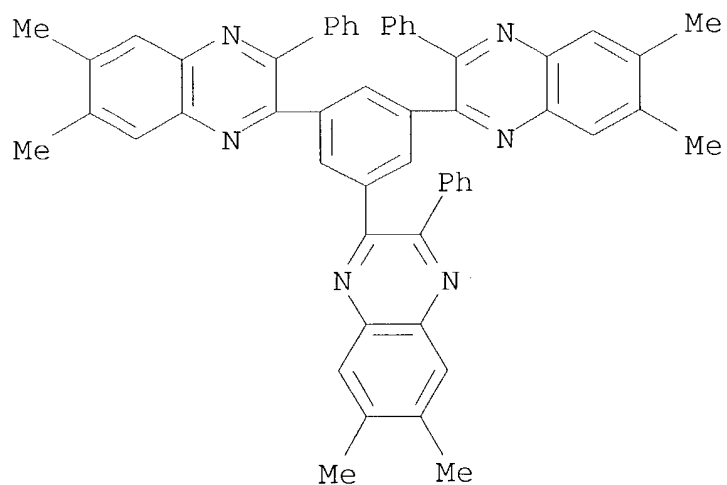


IT 203915-07-5P 213965-08-3P 213965-13-0P
 214132-58-8P 214132-61-3P

(synthesis of phenylquinoxaline low molar mass glasses as
 electron-transport materials in org. **light-**
emitting diodes)

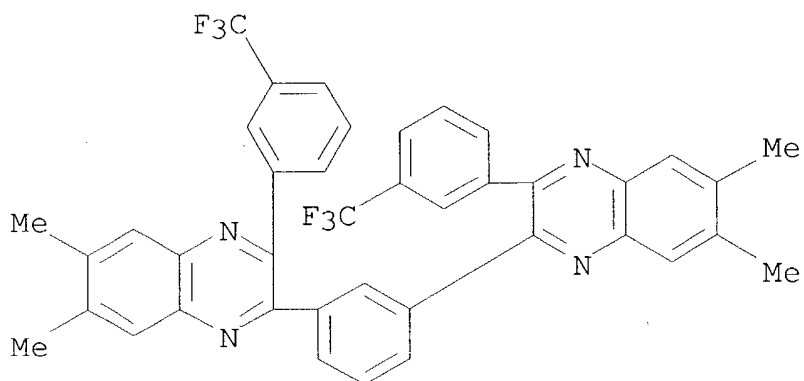
RN 203915-07-5 HCAPLUS

CN Quinoxaline, 2,2',2''-(1,3,5-benzenetriyl)tris[6,7-dimethyl-3-phenyl-
 (9CI) (CA INDEX NAME)



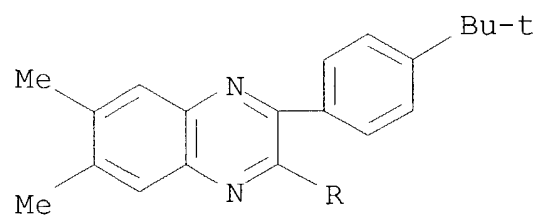
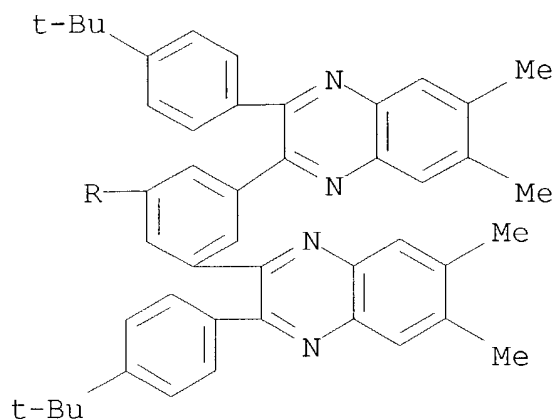
RN 213965-08-3 HCAPLUS

CN Quinoxaline, 2,2'-(1,3-phenylene)bis[6,7-dimethyl-3-[3-(trifluoromethyl)phenyl]- (9CI) (CA INDEX NAME)

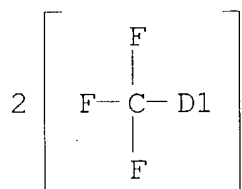
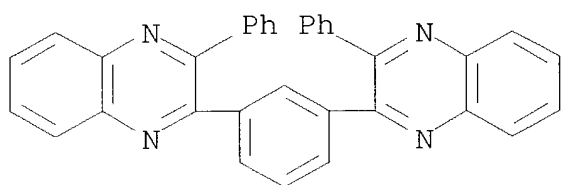


RN 213965-13-0 HCAPLUS

CN Quinoxaline, 2,2',2''-(1,3,5-benzenetriyl)tris[3-[4-(1,1-dimethylethyl)phenyl]-6,7-dimethyl- (9CI) (CA INDEX NAME)



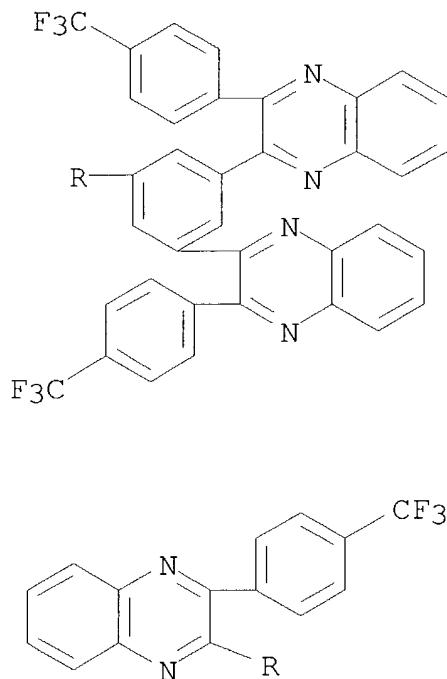
RN 214132-58-8 HCAPLUS
 CN Quinoxaline, 2,2'-(1,3-phenylene)bis[3-phenyl-6(or
 7)-(trifluoromethyl)- (9CI) (CA INDEX NAME)



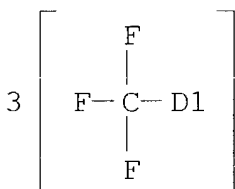
RN 214132-61-3 HCAPLUS
 CN Quinoxaline, 2,2',2''-(1,3,5-benzenetriyl)tris[6(or
 7)-(trifluoromethyl)-3-[4-(trifluoromethyl)phenyl]- (9CI) (CA INDEX

NAME)

PAGE 1-A



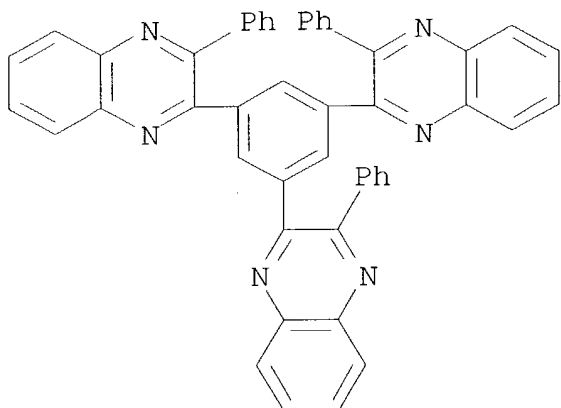
PAGE 2-A



CC 37-3 (Plastics Manufacture and Processing)
 ST polyphenylquinoxaline **light emitting** diode;
 phenylquinoxaline glass **light emitting** diode
 IT Fluorescence
 Glass transition temperature
 Thermal properties
 (of phenylquinoxaline polymers and low molar mass glasses for use
 as electron-transport materials in org. **light-**
emitting diodes)

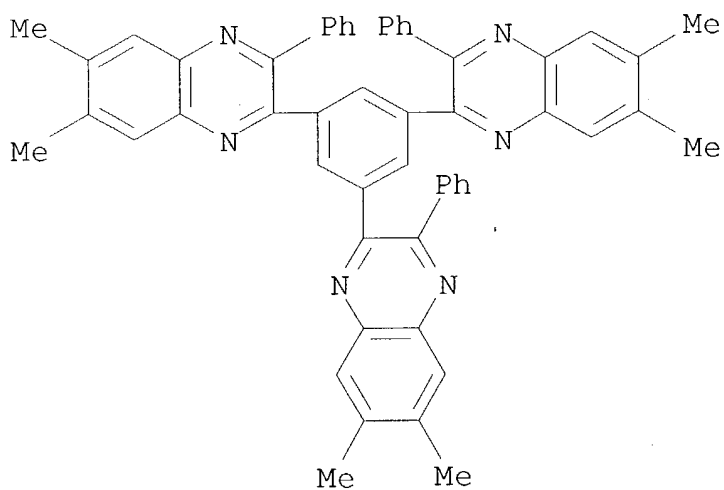
- IT Polyquinoxalines
(polyphenylquinoxalines, polydiketone-; prepn. of phenylquinoxaline polymers and low molar mass glasses for use as electron-transport materials in org. **light-emitting** diodes)
- IT **Electroluminescent** devices
(prepn. of phenylquinoxaline polymers and low molar mass glasses for use as electron-transport materials in org. **light-emitting** diodes)
- IT 164025-88-1P
(in synthesis of phenylquinoxaline low molar mass glasses as electron-transport materials in org. **light-emitting** diodes)
- IT 118688-56-5P, 1,3,5-Tris(phenylethynyl)benzene 152406-27-4P
213965-09-4P 213965-10-7P 213965-11-8P
(intermediate; in synthesis of phenylquinoxaline low molar mass glasses as electron-transport materials in org. **light-emitting** diodes)
- IT 13141-36-1P, 1,3-Bis(phenylethynyl)benzene 213964-99-9P
213965-00-5P
(intermediate; in synthesis of tetraketones for prepn. of phenylquinoxaline polymers and low molar mass glasses as electron-transport materials in org. **light-emitting** diodes)
- IT 25424-26-4P, 1,3-Bis(phenylglyoxaloyl)benzene 213965-01-6P
213965-02-7P
(monomer; for prepn. of phenylquinoxaline polymers and low molar mass glasses as electron-transport materials in org. **light-emitting** diodes)
- IT 25568-78-9P 53028-43-6P 203915-05-3P 213965-03-8P
213965-04-9P 214051-20-4P
(prepn. of phenylquinoxaline polymers and low molar mass glasses for use as electron-transport materials in org. **light-emitting** diodes)
- IT 95-54-5, 1,2-Diaminobenzene, reactions 368-71-8,
4-Trifluoromethyl-1,2-phenylenediamine 626-39-1,
1,3,5-Tribromobenzene 3171-45-7, 4,5-Dimethyl-1,2-diaminobenzene
30454-92-3 68176-57-8
(reactant; in synthesis of phenylquinoxaline low molar mass glasses as electron-transport materials in org. **light-emitting** diodes)
- IT 108-36-1 108-86-1, Bromobenzene, reactions 401-78-5,
3-(Trifluoromethyl)bromobenzene 536-74-3, Phenylacetylene
772-38-3, 4-tert-Butylphenylacetylene 1785-61-1,
1,3-Diethynylbenzene 3972-65-4, 4-tert-Butylbromobenzene
(reactant; in synthesis of tetraketones for prepn. of phenylquinoxaline polymers and low molar mass glasses as electron-transport materials in org. **light-**

- emitting diodes)
- IT 203915-06-4P 213965-06-1P 213965-07-2P
213965-12-9P 214132-59-9P 214132-60-2P
(synthesis of phenylquinoxaline low molar mass glasses as
electron-transport materials in org. **light-**
emitting diodes)
- IT 203915-07-5P 213965-08-3P 213965-13-0P
213965-14-1P 214132-58-8P 214132-61-3P
214132-62-4P
(synthesis of phenylquinoxaline low molar mass glasses as
electron-transport materials in org. **light-**
emitting diodes)
- L8 ANSWER 22 OF 23 HCAPLUS COPYRIGHT 2004 ACS on STN
1998:57735 Document No. 128:210630 Oxadiazoles and phenylquinoxalines
as electron transport materials. Bettenhausen, J.; Greczmiel, M.;
Jandke, M.; Strohhriegl, P. (Universitat Bayreuth, Makromolekulare
Chemie I and Bayreuther Institut fur Makromolekulforschung (BIMF),
95440, Bayreuth, Germany). Synthetic Metals, 91(1-3), 223-228
(English) 1997. CODEN: SYMEDZ. ISSN: 0379-6779. Publisher:
Elsevier Science S.A..
- AB The synthesis of a no. of star-shaped oxadiazoles and
phenylquinoxalines is described. These low molar mass compds. are
able to form stable glasses with glass-transition temps. up to 248
°C. The materials have been tested as electron transport
layers in **light-emitting** devices (LEDs) together
with poly(1,4-phenylenevinylene) (PPV). The two-layer LEDs show an
improved quantum yield and brightness compared to PPV-monolayer
LEDs.
- IT 203915-06-4P 203915-07-5P 203915-08-6P
203915-09-7P
(prepn. and characterization of oxadiazoles and
phenylquinoxalines as electron transport materials for LEDs)
- RN 203915-06-4 HCAPLUS
- CN Quinoxaline, 2,2',2''-(1,3,5-benzenetriyl)tris[3-phenyl- (9CI) (CA
INDEX NAME)



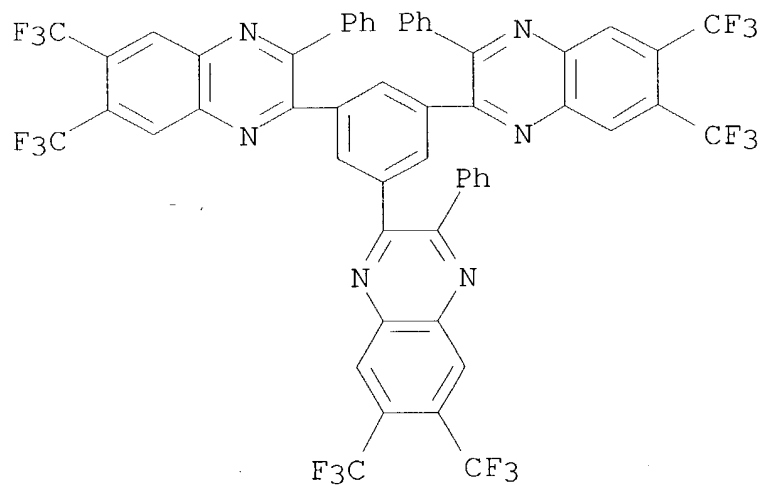
RN 203915-07-5 HCAPLUS

CN Quinoxaline, 2,2',2''-(1,3,5-benzenetriyl)tris[6,7-dimethyl-3-phenyl-
(9CI) (CA INDEX NAME)



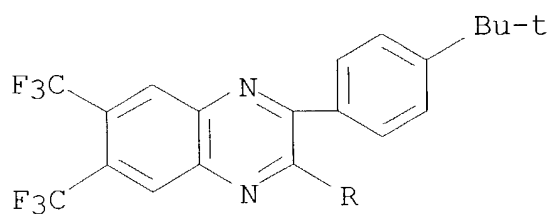
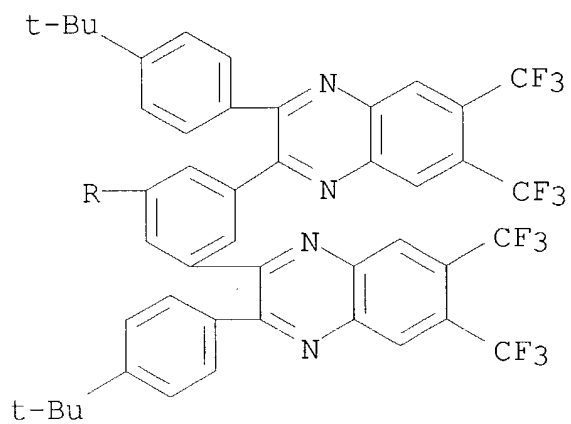
RN 203915-08-6 HCAPLUS

CN Quinoxaline, 2,2',2''-(1,3,5-benzenetriyl)tris[3-phenyl-6,7-
bis(trifluoromethyl)- (9CI) (CA INDEX NAME)



RN 203915-09-7 HCAPLUS

CN Quinoxaline, 2,2',2''-(1,3,5-benzenetriyl)tris[3-[4-(1,1-dimethylethyl)phenyl]-6,7-bis(trifluoromethyl)- (9CI) (CA INDEX NAME)



CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related

Properties)

Section cross-reference(s): 38

IT **Electroluminescent** devices

Electron transport

(prepn. and characterization of oxadiazoles and phenylquinoxalines as electron transport materials for LEDs)

IT 53028-43-6P 159526-24-6P 203915-01-9P 203915-02-0P

203915-03-1P 203915-05-3P **203915-06-4P**

203915-07-5P 203915-08-6P 203915-09-7P

214051-20-4P

(prepn. and characterization of oxadiazoles and phenylquinoxalines as electron transport materials for LEDs)

L8 ANSWER 23 OF 23 HCAPLUS COPYRIGHT 2004 ACS on STN

1997:491099 Document No. 127:142616 organic **electroluminescent** device using quinoxaline compound with high luminescent efficiency. Ebisawa, Akira; Inoue, Tetsuji (TDK Electronics Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 09188874 A2 19970722 Heisei, 100 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1995-353061 19951229.

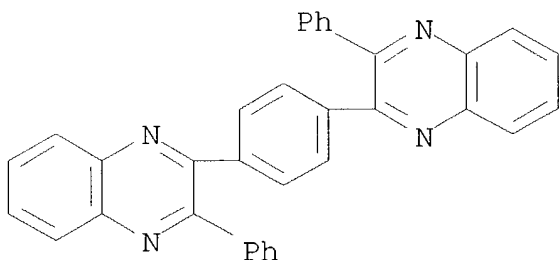
AB The device has ≥ 1 org. compd. layer contg. a quinoxaline compd. QnL (Q = pyrazinyl condensed with 6-membered arom. ring contg. 0-2 N atoms; n = 2, 3; one of Q = 2- or 3-quinoxalinyl if n = 2 and both Qs = quinoxalinyl). The device showed high luminescent efficiency and low driving voltage.

IT **41758-31-0P 193145-68-5P 193145-70-9P**

(org. **electroluminescent** device contg. quinoxaline compd. with high luminescent efficiency)

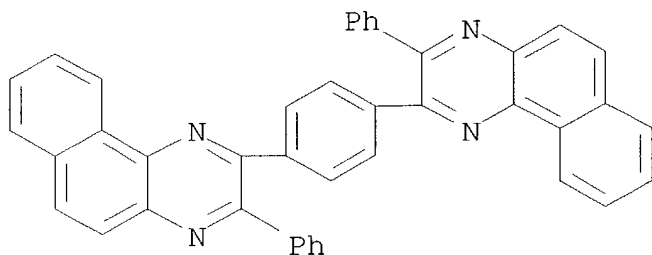
RN 41758-31-0 HCAPLUS

CN Quinoxaline, 2,2'-(1,4-phenylene)bis[3-phenyl- (9CI) (CA INDEX NAME)



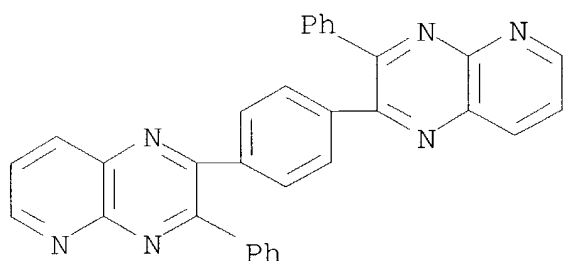
RN 193145-68-5 HCAPLUS

CN Benzo[f]quinoxaline, 2,2'-(1,4-phenylene)bis[3-phenyl- (9CI) (CA INDEX NAME)



RN 193145-70-9 HCAPLUS

CN Pyrido[2,3-b]pyrazine, 2,2'-(1,4-phenylene)bis[3-phenyl- (9CI) (CA INDEX NAME)



IC ICM C09K011-06

ICS H05B033-14; H05B033-22

CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

Section cross-reference(s): 28

ST quinoxaline compd **electroluminescent** device; electron injecting transporting quinoxaline **electroluminescent** device

IT **Electroluminescent** devices

(org. **electroluminescent** device contg. quinoxaline compd. with high luminescent efficiency)

IT **41758-31-0P** 60516-68-9P 193145-62-9P 193145-63-0P
193145-64-1P 193145-65-2P 193145-66-3P **193145-68-5P**
193145-69-6P **193145-70-9P** 193145-71-0P 193145-72-1P
193145-73-2P 193145-74-3P

(org. **electroluminescent** device contg. quinoxaline compd. with high luminescent efficiency)

IT 193145-75-4P

(org. **electroluminescent** device contg. quinoxaline compd. with high luminescent efficiency)

IT 54-96-6, 3,4-Diaminopyridine 92-87-5, [1,1'-Biphenyl]-4,4'-diamine
95-54-5, o-Phenylenediamine, reactions 102-51-2,

4-Methoxy-o-phenylenediamine 452-58-4, 2,3-Diaminopyridine
496-72-0, 3,4-Diaminotoluene 771-97-1, 2,3-Diaminonaphthalene
938-25-0, 1,2-Diaminonaphthalene 3363-97-1 13754-19-3,
4,5-Diaminopyrimidine 22711-23-5 47709-64-8,
4,4'-Bis(phenylglyoxaloyl)biphenyl 53348-04-2,
9,10-Diaminophenanthrene

(org. **electroluminescent** device contg. quinoxaline
compd. with high luminescent efficiency)

IT 193145-67-4P

(org. **electroluminescent** device contg. quinoxaline
compd. with high luminescent efficiency)

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